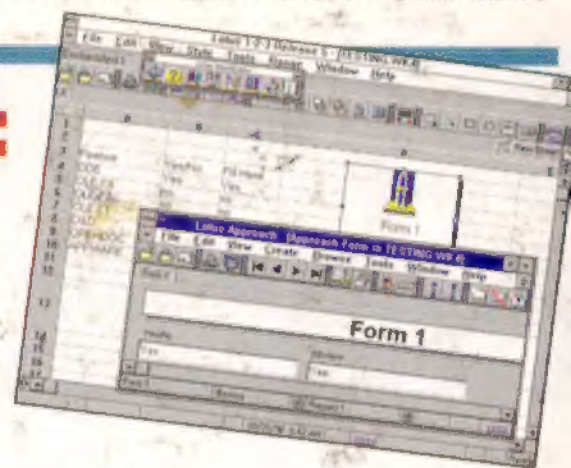


PC
MAGAZINE

EDITORIAL
LIBRARY

Application Suites:
Microsoft, WordPerfect,
And Lotus Duke It Out.
But Are They Suites Yet?



NETWORK
EDITION
MAGAZINE

The Promise and
The Products:
PC Labs Tests Six
ISDN Solutions

CAD Gets a Face-
Lift: AutoCAD
Meets New Low-
Cost Challengers

Multimedia

Kits

CD-ROM

+

Sound

+

Speakers

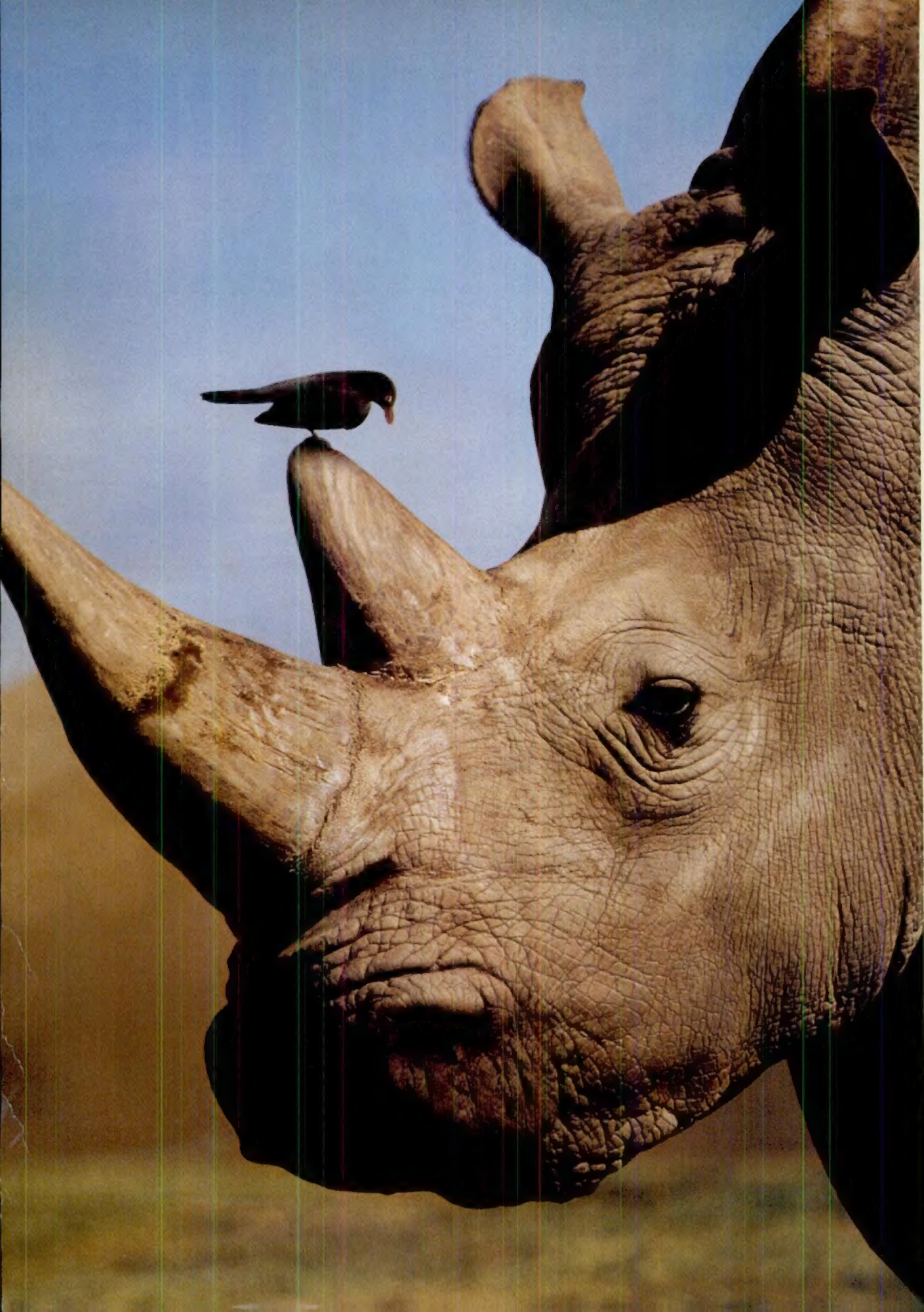
+

Software



**Which Bundle Works
Best for You?**

**THEY SHARE.
THEY COMPLEMENT
EACH OTHER.
THEY GIVE AND TAKE.**

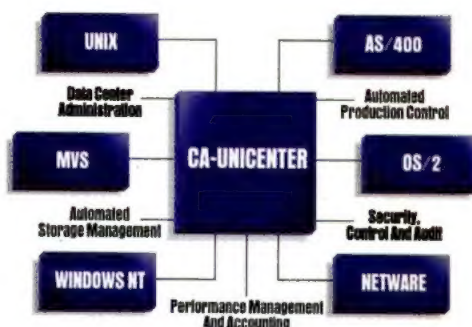


Presenting The 7 Of Systems Mana



1 Replace Disparate
Point Products With A
Single, Integrated,
Comprehensive Solution.

2 Choose A Client/Server
Application That's
Interoperable, Scalable
and Portable.



3 Demand An Open
Solution That Supports
All Key Industry Standards
And Protocols.



**COMPUTER
ASSOCIATES**
Software superior by design.

Commandments Management Software.



4 Standardize On A Common GUI Interface That Makes It Easier To Use. Reduce Training Costs And Boost Productivity.



7 Protect All Your Data With Bulletproof Security Software That Supports Every Platform And Operating System Across Your Entire Enterprise.

5 Partner With The World's Leading Software Company.



6 Leverage Your Systems Management Experience, Expertise And Personnel.



When choosing your systems management software, you shouldn't have to make a leap of faith. And with new CA-Unicenter[®], you don't have to. Because CA-Unicenter is the single, integrated systems management solution that solves all of the challenges of managing client/server computing across heterogeneous platforms.

So call today for more information about the systems management software you can believe in: CA-Unicenter.

Call 1-800-225-5224 Dept. 10007 For More Information And To Register For The CA-Unicenter Software Giveaway.

CIRCLE 348 ON READER SERVICE CARD

CA-Unicenter[®]

Integrated Client/Server Systems Management Software

© Computer Associates International, Inc., Ispindia, NY 11788-7000. Offer good in U.S. and Canada only. All other product names referenced herein are trademarks of their respective companies. Requirements for Software Giveaway available through toll-free number.

MAKE WINDOWS & DESKTOP CONFERENCING EASIER

WITH ON-SCREEN INPUT

INTRODUCING

PenDirect™

for Windows™

WORK NATURALLY — PenDirect brings Windows to life with state-of-the-art light pen input. Interaction is fast, natural and one-to-one. No other input device is better for comfortable, strain-free Windows computing.



SAVE MONEY —

PenDirect for Windows includes everything in one low-price bundle: a light pen (works with all Windows apps and external monitors), external interface, light pen driver for Windows and DOS, and FutureLabs' TalkShow point-to-point desktop conferencing software.

BUY WITH CONFIDENCE — PenDirect is backed by an unconditional, 30-day, no-risk, no-hassle, money-back guarantee, and a limited two-year warranty.

ONLY \$298
limited-time offer

Try PenDirect **FREE** for 30 days, and keep the TalkShow Duo software even if you return PenDirect!

ORDER NOW

800-962-3907

Corporate • Government • Educational
P.O.s Accepted
CIRCLE 200 ON READER SERVICE CARD

**FTC DATA
SYSTEMS**

The Leader
in Light Pen Technology

6361 Katella Avenue • Stanton, CA 90680
714-995-3900 • 714-995-3900 FAX
E-Mail: 70444.66@compuserve.com

Inside

Have you ever installed a multimedia upgrade kit in your PC? Do you know anyone who has? Finding a kit with the right combination of CD-ROM drive, sound board, and speakers is hard enough; making everything work together

can be nothing short of maddening. Questions such as "Which memory addresses and interrupts are available?" begin to haunt you.

Imagine, then, taking 16 of these kits, making their components work together in a series of PCs, and then evaluating and

didn't find the perfect multimedia kit to meet everyone's needs, they did find a variety of capabilities and prices. One of the products here should appeal to you.

If finding the right combination of hardware is challenging, finding the right software combination is only harder. For

our story "Desktop Applications: Are They Suites Yet?" associate editor Ted Stevenson and project leader Amarendra Singh shepherded a team of reviewers through the intricacies of evaluating the standalone word processing, spreadsheet, and database modules of today's big suites, as well as the integration



Erlanger and Zulich: Making multimedia.

of these individual components.

And for the ultimate challenge, we tackled ISDN solutions in our story "Betting on the Dream." ISDN poses problems and prospects that go way beyond the desktop.

That's the challenge we handed to associate editor Leon Erlanger and project leader Mike Zulich, who worked closely with Jae Yang—a project leader at ZD Labs—to pull together this issue's cover story on multimedia upgrade kits, "Moving up to Multimedia."

As you can see, solutions in all spheres of personal computing today require the integration of smaller components. Putting it all together is a challenge we all face.

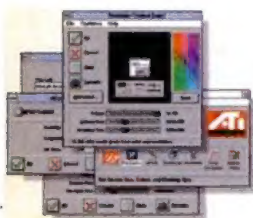
— Michael J. Miller

PC Magazine: The Independent Guide to Personal Computing, ISSN 0888-8507, is published biweekly except in July and August for \$49.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5802. Second-class postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO 80322-4093. GST Registration Number: R-123669673. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.

The squadron of 64-bit graphics accelerators from ATI – the GRAPHICS PRO TURBO, WINTURBO and GRAPHICS XPRESSION – has landed. Affordably priced from only \$179, they're attacking computers with rocket-like performance, laser sharp graphics and galactic true colors.

Hi-res, True Color Galaxies

Resistance is futile. High resolutions of up to 1280x1024 and 16.7 million true colors will overwhelm you. These advanced accelerators propel applications faster in true color than other cards using just 256 colors. And the superior performance, up to 42 million



FlexDesk+

For enhanced operation and complete control of Windows options

Winmarks*, will conquer even the most complex applications. Plus, the flicker-free display – at up to 100Hz – reduces eye-strain over prolonged periods of attack.

Propelling Windows

Armed with an arsenal of utilities to enhance Windows, the mach64 graphics accelerators breeze through Windows applications quickly and effortlessly. The unique WinSwitch feature allows color and resolution to be changed - without restarting Windows. A stellar range of software drivers enable popular operating systems to be explored – OS/2, UNIX, Windows NT, CAD, DOS and others.



WinSwitch

Change resolution and color without exiting Windows

Beam up an ATI 64-bit graphics accelerator today. There's one to meet every application, budget and bus type. They're light years ahead of other accelerators.

Copyright © ATI Technologies Inc., 1994. ATI, mach64, WinSwitch, FlexDesk+, GRAPHICS PRO TURBO, GRAPHICS XPRESSION and WINTURBO are trademarks and/or registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Features, performance and specifications may vary by operating system and board model and are subject to change without notice.

* WinBench 4.0 and PC Bench 8.0 performance tests done on a Pentium 90MHz, 16MB RAM, 256K cache, 420 MB HD, using 2MB and 4MB PCI graphics cards. WinBench 4.0 at 1024x768/256 colors (large fonts) and 800x600 in 16.7M colors (small fonts) at 70Hz refresh rate.

**Suggested US retail price, dealers may sell for less.

Invasion of the 64-bit Graphics

- Fast 64-bit Acceleration
- Affordably Priced from \$179**
- Instant Windows Mode Switching

OTHER FEATURES

- Built-in motion video acceleration at no additional cost
- Fast DOS and VGA performance
- Supports OS/2, Windows, and Windows NT at any resolution, any color depth
- Up to 1280x1024 in 256 colors or 800x600 in 16.7 million colors with 2MB versions
- Easy installation and configuration
- Energy efficient Green PC support
- 5 year warranty
- ISA, PCI and VESA Local Bus versions



WINBENCH 4.0 - 16.7 million colors



WINBENCH 4.0 - 256 colors



Outperforms other accelerators in Windows.

GRAPHICS PRO TURBO

- For professional true color graphics
- 2MB (upgradeable) or 4MB VRAM memory
- Up to 1280x1024 resolution in 16.7 million colors
- Color calibration software
- Up to 100Hz refresh rate

WINTURBO

- Value priced VRAM accelerator (similar to GRAPHICS PRO TURBO)
- 2MB VRAM memory
- VRAM offers better performance at higher refresh and color depths

GRAPHICS XPRESSION

- Performance equal to VRAM accelerators at 256 colors
- 1MB (upgradeable) to 2MB DRAM memory
- Up to 75Hz flicker-free display



July 25th 1994



Perfecting the PC

ATI TECHNOLOGIES INC.

33 Commerce Valley Drive East
Thornhill Ontario Canada L3T 7N6
Telephone: (905) 882-2600 ext. 4111
Facsimile: (905) 882-2620
CompuServe: GO ATITECH

Fast start . . . No limits!

NEW VERSION 5.0

Paradox

The screenshot displays the Paradox 5.0 for Windows interface. The main window is titled 'Paradox for Windows - [WorldOptics Order Entry System]'. It features a menu bar (File, Edit, View, Form, Record, Properties, Tools, Window, Help) and a toolbar. The interface is divided into several sections: a 'Customer' section with fields for Contact Name (Loren Niday), Telephone (+44-71-123456), and Company Name (The Camera Shop); an 'Order' section with a table of orders (Order No., Date, Total Amount, Status, Ship via, Ordered by, PO No.); and three product categories: 'Camera', 'Filters', and 'Video Camera', each with a table of items (Qty, Unit Price, Total Price) and an image. The 'Camera' table shows 2 units at 1,195.00 each, totaling 2,390.00. The 'Filters' table shows 2 units at 19.00 each, totaling 38.00. The 'Video Camera' table shows 1 unit at 1,565.00, totaling 1,565.00. At the bottom, there are buttons for 'New Order', 'Find Customer', 'Delete Order', 'Print Invoice', 'Upload Orders', and 'Graph Sales'. A secondary window titled 'WordPerfect [Paradox For Windows - Paradox 5] - FILTERS.DOC' is also visible, showing a letter template with a 'WORLD OPTICS' logo and a list of customers.

New version is easier than ever

The new Paradox® 5.0 for Windows is here, and managing your business data and building database applications just got faster and easier. New Interactive Coaches quickly teach you how to accomplish any task, while working with your own "live" data. On-line Experts™ guide you step-by-step in creating professional-looking forms, reports, and mailing labels. Even your largest data management tasks will be completed with unbelievable speed and accuracy.

More speed, developer enhancements, and Client/Server connectivity

New Paradox 5.0 for Windows has been tuned to give you the highest possible performance. It stores and retrieves data faster. Delivers answers to queries faster. And for Paradox developers, there's

Comparison Facts

End-user Features	Paradox 5.0	Access 2.0
Built-in computer-based training	✓	
Integrated graphics	✓	
Built-in workgroup and mail capabilities	✓	
Quick Filter without Query Process	✓	
Power-user Developer Features		
OLE 2.0 client and server support	✓	
Compatibility with applications from previous version	✓	
Transparent connectivity and scalability with database aliases	✓	
Record level locking	✓	
Graphical Integrated Development Environment (IDE)	✓	
ODBC-compliant	✓	✓
Dedicated high-performance native SQL drivers	✓	

a new Integrated Development Environment and more than 300 new ObjectPAL™ Methods and Properties that help you develop Windows applications in record time. Plus, with the new native SQL drivers, Paradox is ready when you are to upsize your applications to the Client/Server environment.

Office integration outshines Access

Full client and server support for OLE 2.0 and DDE make Paradox for Windows the best database for use with other applications including Perfect Office and Microsoft Office. For example, place a "live" Paradox table directly into a Word document, and edit it in place. (Can't do that with Access.)

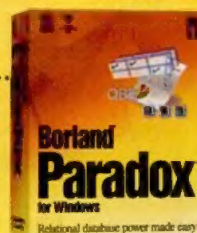
Try new Paradox 5.0 for Windows today. You'll discover it's the one database with the depth and performance you want to stay with. And watch for the Paradox World Tour coming soon. Call FastFax for dates and locations.

Special competitive upgrade offer **\$199⁹⁵** 90-day money-back guarantee

See your dealer, or call today!

1-800-336-6464, ext. 9131

In Canada call 1-800-461-3327 FastFax 1-800-408-0001



Borland
The Upsizing Company

UP FRONT

Inside

Making multimedia.....4

Letters

The world of cybersex19

Trends

- Wiring the telecommuter
- Cooler notebooks
- Computing without borders
- Pipeline: The rating game.....29

First Looks

- Matrox MGA Impression Plus
- Bell South Simon
- First Floor Network Central
- Shapeware Visio 3.0.....37

New & Improved

BY ADAM A. HICKS61

Read Only

EDITED BY TIN ALBANO73

COLUMNISTS

Michael J. Miller

Checking into Suites.....79

Bill Machrone

Needed: A Fee-Based Internet.....87

John C. Dvorak

Are You an Electronic Criminal?.....93

Inside Track.....95

Jim Seymour

The Consumer (Influence) Reins.....99

Bill Howard

Sinking the Sub in Subnotebooks107

COVER STORY

Multimedia Upgrade Kits

Moving Up to Multimedia

BY JOHN R. QUAIN

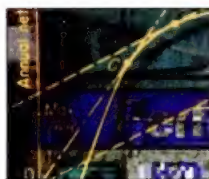
If you want to take advantage of the latest and best educational software, entertainment titles, and reference works for fun and business, then it's time to upgrade that silent computer with a multimedia upgrade kit. We test 16 multimedia upgrade kits that give you everything you need—sound board, CD-ROM drive, and (usually) speakers and free CDs—all in one box. We also examine four multimedia-ready systems from top vendors and test them alongside the kits to see which is best112

ACS/KRIS Compro Multimedia Upgrade Kit135	MediaMagic DSP-16 Sound System.....138	Toptek Multimedia Advanced Upgrade Kit154
Aztech Sound Galaxy Voyager135	Media Vision Super Deluxe Multimedia Kit and Premium Deluxe Multimedia Kit.....146	Turtle Beach MultiSound Monterey Kit.....157
Creative Labs Game Blaster CD 16136	Megamedia SS20.....151	Editors' Choice.....115
Creative Labs Sound Blaster Edutainment CD 16136	Ocean Vienna151	Glossary.....116
Creative Labs Sound Blaster Digital Edge 3X.....136	Plexor 4PLx Sound Chaser152	Performance Tests.....116
Identity IDCKIT1138	Reveal Quantum.....152	Do MPC Systems Measure Up?126
	Sigma Designs ReelMagic CD-ROM Upgrade Kit.....154	Summary of Features.....142

FEATURES

Software

Desktop Applications: Are They Suites Yet?



BY MICHAEL J. MILLER

Word processors, spreadsheets, and databases have come a long way, but are today's suite products integrating them successfully? We review the applications in the three major suites, explore the goodies that come with them, and give you an insider's look at how far Lotus, Microsoft, and WordPerfect/Novell have come in integrating your workspace159

What's in the Suites.....160	Microsoft Access 2.0201
Highlights161	Paradox 5.0 for Windows, Workgroup Edition.....202
Word Processors	Performance Tests:
Ami Pro for Windows 3.1162	Databases205
Microsoft Word for Windows 6.06a168	Suite Little Extras
WordPerfect 6.0a for Windows172	Microsoft Mail for PC Networks.....207
Performance Tests: Word Processors.....179	GroupWise.....207
Spreadsheets	Lotus Organizer.....210
Lotus 1-2-3 for Windows 5.0 ..182	InfoCentral for Windows.....210
Microsoft Excel 5.0185	Highly Presentable
Quattro Pro 5.0 for Windows, Workgroup Edition.....188	Graphics206
Performance Tests:	Suite Integration
Spreadsheets192	Lotus SmartSuite 3.0 for Windows211
Databases	Microsoft Office Professional 4.3216
Lotus Approach 3.0196	PerfectOffice 3.0 for Windows218

Networking

ISDN Products: Betting on the Dream

BY FRANK J. DERFLER, JR.

ISDN could be a dream technology. It offers digital data transmission at much higher speeds than over analog lines—at least four times as fast. ISDN is well suited for video-conferencing, linking networks by dial-up server, and transferring files. It will be a boon for fans of on-line services. But ISDN services are still not widely available in the United States, and the products you can use to access ISDN are not very mature. On the bright side, these ISDN products are available today to provide fairly fast, transparent, on-demand ISDN connections between a local LAN and a remote LAN or PC. We examine ISDN connection solutions, both external and internal, from six vendors.....267

Ascend Pipeline 50274	ISDN Nuts and Bolts270
Combinet Everywhere 160 and 400274	Performance Tests272
DigiBoard PC IMAC and PC IMAC/4275	Suitability to Task275
Extension Long Distance LAN Adapter E-101 and E-201 .282	A Glossary of Terms for ISDN277
Gandalf LANLine 5240i . .287	Equipment for Moving Heavy Data Across ISDN Lines .278
Intel Remote Express ISDN Bridge Pack and LAN Adapter . .288	One Man's ISDN Travails . .279
Highlights268	IBM's Analog/Digital Twist282
Editors' Choice269	Tales from ISDN Pioneers .283
	Summary of Features286
	A Jack of All Trades287



Graphics

2-D CAD Software: CAD's New Face

BY JOEL N. ORR

CAD vendors have slowly started to roll out graphical versions of their software. In our evaluation of 15 CAD packages, we examine how the Windows and OS/2 implementations of these packages have turned out. Are GUI CAD packages really taking advantage of the Windows and OS/2 environments? Are usability features improving? Yes and no. There's still room for improvement, but at least we continue to see positive trends: more high-end features in low-cost packages, amenities that ease architectural and mechanical drawing, and workgroup support and data-sharing features for cooperative working environments221



Angles in

tangles? CAD lets you sort out
the mechanics of drafting
(page 221).

Anvil-1000MD for Windows 2.00223	DynaDesigner for Windows ...246	Ultimate CAD for Windows Base 2.1261
AutoCAD 12 for Windows ...227	MicroGDS 3.2249	Vellum 2.12263
Cadventure for Windows 6232	MicroStation for Windows NT 5252	Editors' Choice222
DesignCAD 2D for Windows 7.0234	MicroStation PC 5252	Suitability to Task224
Draftix CAD Professional for Windows 3.0236	Pj2 CAD System 3.1254	Performance Tests228
Drawbase for Windows Model 4000 1.2237	TrueCAD for Windows 2.10c255	Summary of Features242
	TurboCAD for Windows 2.01259	CAD for Now and the Future250

NETWORK EDITION

Follows page 288

First Looks

- What You See Is What You GetNE1
- Netwave CreditCard AdapterNE17
- StreetMeter 3.0NE18
- WinInstall 4.0NE22
- Office Logic for Windows 1.37NE27
- OnTime Enterprise for Novell NetWare 1.12NE30

New & Improved

- ISDN support for Cisco Systems routersNE33
- Distributed Enterprise Management Architecture ...NE33
- Communique Control Server; Communique Remote Control ServerNE33
- TribeLinkNE35
- VFX/40NE35
- HyperSwitch A100NE35

Technology Spotlight:

A Compressing SituationNE37

Derfler & Greenfield

Is Notes Headed for the Obit Page?
Notes purports to be all things to all people: a database, a workflow package, an e-mail system, even group-discussion software. But does it play these roles well?NE39

PC TECH

User-to-User

BY NEIL J. RUBENKING
Making a boot disk for DoubleSpace or Stacker users; useful undocumented commands in DOS 6.x; a bug in the ALTPAUSE.SYS driver.....289

Tutor

BY JEFF PROSISE
How Secure Is Encrypted Data?.....291

Corporate Developer

BY ROBERT KENDALL
Adding Audio to Your Windows Database Interface294

Toolkits

BY NEIL J. RUBENKING
ForeHelp: Help File Heaven299

Environments

BY CHARLES PETZOLD
Enumerating the Windows NT Enhanced Metafile301

Utilities

BY ROBERT LAUSEVIC
PasteBoard: A Step Beyond the Clipboard308

PC SOLUTIONS

Hardware

The discrepancy between advertised disk size and what your computer tells you; system power-downs due to heat; keeping documentation straight for multiple setups313

Word Processing

Using different first and second sheets when you print316

Spreadsheets

How to ignore invalid cells in 1-2-3 using database functions317

Graphics

Turbocharging PageMaker 4.0 without upgrading to Version 5.0329

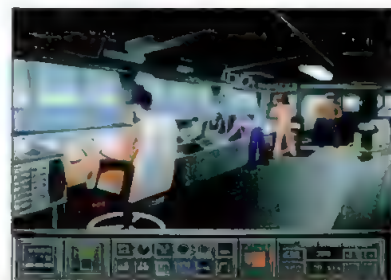
Languages

Playing .WAV files in Borland Pascal330

AFTER WORDS

After Hours

- **Simulation software:** Almost as good as the real thing
- **CD-ROM Pick Hit:** Microsoft Complete Baseball
- **Battle:** Aegis: Guardian of the Fleet
- **Multimedia:** Video Jam
- **Spotlight on Art:** Millenium Auction
- **Quick Clips**419



Captain your own submarine (page 422).

Abort, Retry, Fail?

BY DON WILLMOTT426

ALSO IN THIS ISSUE

- Direct Marketing Connection.....313
- Marketplace.....383
- Premier.....383
- Classified.....393
- Business Cards407
- Reader Service Card409
- Index to Advertisers413
- Advertisers' Product Index414
- Coming Up.....416
- Editorial Product Index.....417



What's wrong with this picture (page 426)?

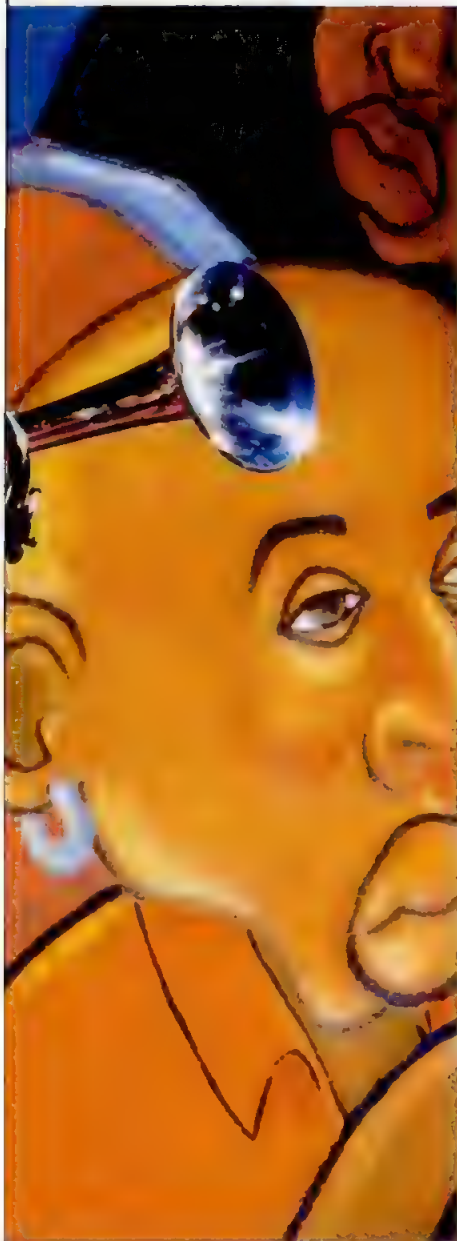
AT 720 x 720 DPI, THE INK JET WILL



▲ Actual 720 x 720 dpi output from the EPSON Stylus COLOR Ink Jet.

720 dpi printing requires special coated paper (12.5¢ MSRP/sheet). 360 dpi prints on plain paper. Price may vary. Actual output has been trimmed to remove border. HP and DeskJet are registered trademarks of Hewlett Packard Co. EPSON and EPSON Stylus are registered trademarks of SEIKO EPSON CORP.

EPSON STYLUS COLOR BLOW YOU AWAY.



The High Definition EPSON Stylus COLOR Ink Jet.

Dazzling color. Near photographic reproduction. That's what sets the High Definition EPSON Stylus COLOR ink jet printer apart from other personal ink jets. As the world's first and only 720 x 720 dpi ink jet, it prints over five times more dots per square inch than the HP DeskJet 560C. And more dots means better looking charts, graphs, pictures and text. Yet at under \$600, it's amazingly affordable.



“ Nobody believed that this level of quality could get to this price point. ”

— BIS Strategic Decisions

The EPSON Stylus COLOR not only prints brilliant color, it also prints razor-sharp black & white. And its unique software driver lets you make on-screen color adjustments, then returns you to your application faster. The EPSON Stylus COLOR blows every other personal ink jet off the page. When you see it for yourself, you'll be blown away, too. For information, visit your EPSON dealer or call the number below.

EPSON

1-800-BUY-EPSON

Ext. 3033



Editor-in-Chief Michael J. Miller

Editor Robin Raskin

Executive Editors Rick Ayre, Bill Howard, Don Willmott

Director, PC Labs C. James Galley III

Senior Networking Editor Frank J. Derfler, Jr.

Senior Editors Christopher Barr (West Coast), David Greenfield (Networking and Communications), Brian Nadel (First Looks)

Managing Editor Paul B. Ross Assistant Managing Editor Dianne H. McDonald

Senior Associate Editor Ted Stevenson (Software) Associate Editors John Clyman (PCs), Gayle C. Ehrenman (After Hours), Leon Erlanger (Hardware), Carol Levin (Trends), Thomas Mace (Applications Development), Gail Shaffer (Networking and Communications), Sharon Terdeman (Technical Columns), Lance N. Ulanoff (Graphics) Technical Editor Neil J. Rubenking Senior Production Editors Shari L. Girouard, Kim Schueler Copy Chief Glen Boisseau Becker Staff Editors Tin Albano, Jamie M. Bsates, Kathleen Caster, Elisabeth H. Holzer, Vicki B. Jacobson, Ellyn J. McCasland, Michael W. Muchmore, Sarah L. Roberts, Michael Ryan, Craig L. Stark, Carol A. Venezia, Leslie Wygant, Anush Yegyzarian Senior Writer Robert S. Anthony Staff Writer William P. Flanagan Assistant Editor Adam A. Hicks Senior Copy Editors Jeanne Albrecht, Jill Léger Copy Editors Joseph N. Levine, Ann Ovodow, Michele Pepe, Asa Somers Assistant Copy Editors Jay Amster, Elliot Thomas Grant, Peter J. McLaughlin Layout Manager Linda Harms Assistant Layout Manager Shelly Fierston Senior Layout Editors Thomas DeVito, Lillian Gaffney Librarian Thomas W. Giebel Library Assistant Dolores Williams Senior Editorial Researchers Angela Hickman, Brad Stilwell, Jodi L. Wynblatt Editorial Researchers Mary E. Behr, Eryn R. Brown, Brendon M. Macaraeg, Todd Spangler Editorial Assistant Melissa J. Perenson System Support Manager Craig Ellison PC Support Analyst Melvin Acevedo Production System Support Manager Patricia Perkowski Communications Manager Diana Garelik Assistant to the Editor-in-Chief Tara Solon Assistant to the Editor Rita Aprahamian Assistant to the Executive Editors Christina M. Evelyn Administrative Assistant Christina Okang Sysop, PC MagNet Ken Hipple

Contributing Editors Bill Machrone (Publishing Director), Douglas Boling, Bruce Brown, Brian Butler, Sheryl Canter, Ray Duncan, John C. Dvorak, Lori Grunin, Nick Lippis, Michael J. Mefford, Edward Mendelson, Charles Petzold, Alfred Poor, Jeff Prosser, John R. Quain, Sal Ricciardi, Steve Rigney, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

Senior Art Director Lisa A. Sergi Associate Art Directors Charles Conover, Curtis M. Fields, Donna Panagakos Associate Graphics Director David Foster Graphic Artist Mark Tyner Assistant to the Art Director Frieda T. Smallwood Contributing Photographer Thom O'Connor

Technical Directors Ben Z. Gottesman (Software), Nick Stam (Hardware) Testing Coordinator Steve Buehler Project Leaders Jeffrey D. Baher (Network First Looks), Amarendra Singh (Software), Robert P. Lipschutz (Networking and Communications), Jeff Mace (Graphics), Jay Munro (Applications Development), Richard Fisco (PCs), Michael J. Zulich (Hardware) Programmers Richard V. Dragan, Kenneth Prakobchart Product Testing Manager Charles Rodriguez Technical Analysts Daniel A. Begun, Laura Cox, Tim M. Crawford, John Garris, Margaret A. Piemonte, Deval Shah, Dan Smith, O. Ryan Tabibian Support Technicians Peter Bastide, Marino Delzotto, Bruce Kowalski, Denis Tom, Mark Valentine Operations Manager John R. Delaney Inventory Control Coordinators Rob Graydon, William Pagan, Mark Randall Administrative Assistant Jacqueline Paredes

Publisher Jim Stafford

Associate Publishers Anna Zornosa (West Coast), Daniel Rosensweig, Karla Spormann (Publisher, Network Edition), Michael Perkowski (Marketing) National Sales Manager Bill Stephen Business Manager Chris Eisenhardt Research Director Jaime LeVine Assistant Research Manager Scott Gibson Marketing Manager/Network Edition John Wisdom Client Services Manager Steve Robinson Sales Development Manager Susan Federspiel Events Manager Dawn Gudelis

Senior Advertising Production Manager Lori Iaccino Advertising Production Manager Pamela Berkowitz Assistant Advertising Production Managers Susan Conrad, Robert Joy Senior Coordinator, Edit Production Mark Baard Coordinator, Edit Production Louise Laberge

Advertising Offices: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

**Ziff-Davis Publishing Company
Chairman Eric Hippeau**

**Business Media Group
President Ronni Sonnenberg**

Group Vice Presidents Claude P. Sheer, Jeff Ballowe Vice Presidents Joseph Gillespie (Magazine Networks), Bob Bader (Central Advertising Sales), Michael J. Miller (Editor-in-Chief PC Magazine), Dan Farber (Editor-in-Chief PC Week), Paul Somerson (Editorial Director PC/Computing), Al DiGuido (Group Publisher), J. Sam Huey (Publisher PC/Computing), Jim Stafford (Publisher PC Magazine), Don Byrnes (Publisher PC Week) Directors Susan Delman (Corporate Marketing), Brenda Wheeler (Public Relations), Ellen Atkinson (Training), Celia Canfield (Ziff-Davis Preferred Customer Program) Sales Development Director, Ziff-Davis Magazine Networks/ZDPC Jeff Bruce Co-Directors of ZD Benchmark Operation Bill Catchings, Mark L. Van Name Director, ZD Labs Bob Kane

Ziff-Davis Publishing Company

Presidents J. Scott Briggs (Consumer Media Group), Bob Brown (Computer Intelligence/InfoCorp), Robert Howells (Information Access Company), J.B. Holston III (International Media Group), Bill Lohse (ZD Expos), Michael Kolowich (Ziff-Davis Interactive), Ken Jeffers (Ziff Technology Group)

Senior Vice Presidents Baird Davis (Circulation), Rachel Greenfield Vice Presidents Tom McGrade (Assistant to the Chairman), James F. Ramaley (Circulation Services), Herbert Stern (Creative Services), Bruce W. Bourne (General Manager), Rayna Brown (Human Resources), Roger Herrmann (Production), Rolf M. Wulfsberg (Research), Robert Ziff (Strategic Planning), Bill Machrone (Technology) Chief Information Officer Wellington Y. Chiu Internal Marketing Consultant Paul H. Chook Editorial Director Lewis D'Yorkin Executive Director, Information Systems Owen Weekley Executive Director, Marketing Services Jim Manning Production Director Walter J. Terlecki, Director of Licensing Jean Lamensdorf Director of Public Relations Gregory Jarboe

**Ziff Communications Company
Chairman and CEO Eric Hippeau**

Senior Vice President & Chief Financial Officer Bruce R. Barnes Senior Vice President Steven C. Feinman Vice Presidents J. Malcolm Morris (General Counsel and Secretary), T.L. Thompson (Business Manager), Timothy J. Mitchell (Controller and Treasurer)

Chairman Emeritus William B. Ziff, Jr.

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call toll-free 800-289-0429 in the U.S. and Canada; all other countries, please contact Ireland: 303-666-3190 or fax 303-666-3191. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.

Subscription Rate: The subscription rate is \$49.97 for a one-year subscription (22 issues). Canada and all other countries, please add \$36.00 for postage.

Back Issues: For back issues (subject to availability), \$8 per issue (\$9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.

Computer Select: *PC Magazine* is available on Computer Select, a CD-ROM published by Computer Library. For subscription information, call Computer Library at 800-827-7889, ext. 708.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints, and compliments to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. Send electronic mail to MCI Mailbox 157-9301, to CompuServe address 72241,104, Internet address 157.9301@mcimail.com, or to PC MagNet (see below). *PC Magazine's* general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Jennifer Roth, Advertising Department, at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay \$50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or newspaper clippings with Abort, Retry, Fail?, mark up the photocopy, not the original.

PC MagNet

PC Magazine operates PC MagNet, an on-line service of ZiffNet, hosted by CompuServe. To join, set your communications software for 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and PCMAG94 at the ENTER AGREEMENT NUMBER prompt. CompuServe members may join by typing GO PCMAG at any CIS ! prompt. ZiffNet membership is \$2.95 a month, which includes access to *PC Magazine* Editors' Choice awards, Product Reviews Index, Newsbytes, ZiffNet Highlights and Information, and the Support Forum. Connect-time charges vary according to modem speed.

To obtain this issue's utility free of charge: Dial 617-231-4450, with your modem, to access the *PC Magazine* Utilities BBS. Enter your name at the prompt, and follow the menus.

Prodigy members can download *PC Magazine* utilities from ZiffNet Selections on Prodigy for a transfer fee of \$3 per program. Jump 'ziff select' and browse the computing topics for programs.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine's* logo in conjunction with an Editors' Choice designation, write Chantal Tucker; for information on reprints in quantities of 500 or more, write Carol Peters.

PC Magazine Reviews

Except where noted: All *PC Magazine* reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 486/33M's.

Editorial and Business Office: One Park Ave., New York, NY 10016-5802. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100. *PC Magazine* is an independent journal, not affiliated in any way with International Business Machines Corp. IBM is a registered trademark of International Business Machines Corp. Entire contents copyright ©1994 Ziff-Davis Publishing Company, L.P. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are registered trademarks of Ziff-Davis Publishing Company, L.P.: *PC*, *PC Magazine*, *PC Labs*, *PC MagNet*, *PC Magazine Award for Technical Excellence*, *PC Magazine Editors' Choice Award*. The following are trademarks of Ziff Publishing Company, L.P.: Abort, Retry, Fail?; Direct Marketing Connection; First Looks; Lab Notes; New and Improved; PC Marketplace; PC Solutions; PC Tech; Pipeline; Power Programming; Read Only; Trends; Tutor; User-to-User; Utilitas; The Working Word.



It runs so fast, even its price has lost weight.

■ The fastest Ethernet PCMCIA adapter is about to go even faster—because now you can buy it for just \$195* instead of \$250.

Better still, the EtherLink III PCMCIA adapter is built with 3Com's exclusive Parallel Tasking™ technology, delivering performance that is up to 110 percent faster than any other notebook adapter, according to LANQuest Labs.®

On top of that, the EtherLink III PCMCIA adapter now includes Card Services support including unmatched "Hot Swap" capabilities. You can even Hot Swap the card in the middle of network activities without losing your network connection.

Plus, with 3Com's AutoLink™ the EtherLink III PCMCIA adapter installs in under three minutes. Make a single menu selection to install the adapter, configure the drivers, and download NetWare® client files from the server.

What's more, the EtherLink III PCMCIA adapter is compatible with all the leading notebook computers. Guaranteed. Or your money back. You even get a lifetime warranty.

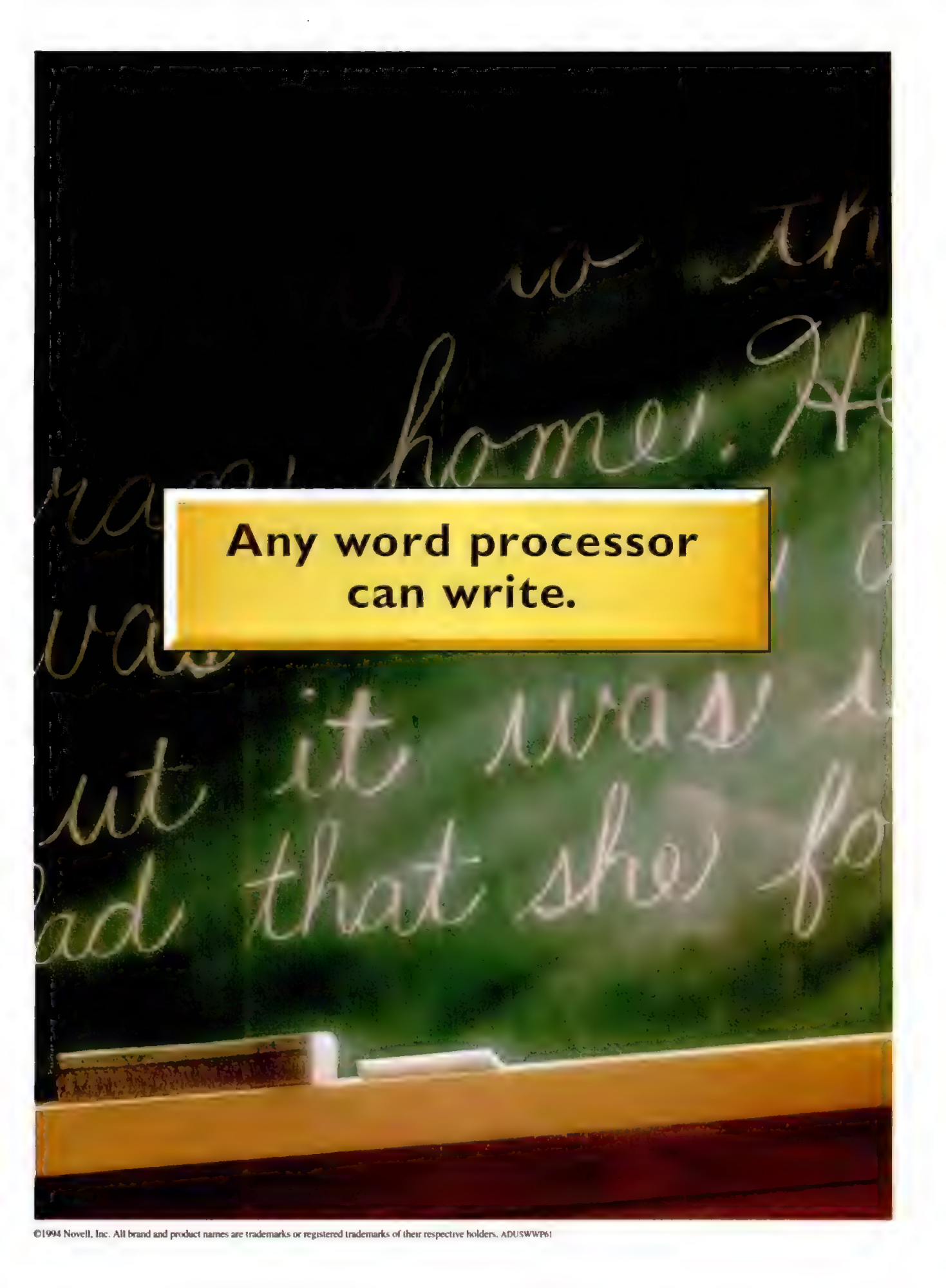
So why not get your evaluation card for as little as \$99† and your free copy of the LANQuest Lab's PCMCIA benchmark reports. Just call 1-800-NET-3Com. But hurry. At these prices you can expect the EtherLink III PCMCIA to go even faster.



Networks That Go the Distance™

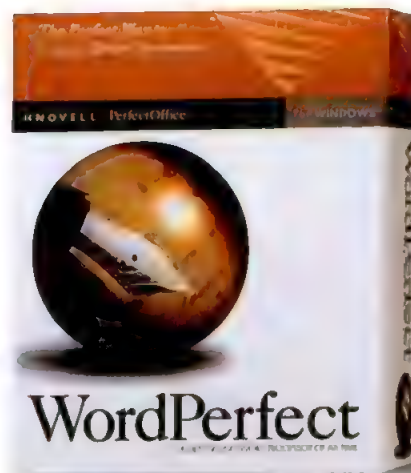
© 1994 3Com Corp. (408) 764-5000. 3Com, Networks That Go the Distance, AutoLink, EtherLink, and Parallel Tasking are trademarks of 3Com Corp. All other trademarks are those of their respective holders. *Estimated street price. † Limit one per customer while quantities last. TP version \$99. Combo version \$129.

CIRCLE 293 ON READER SERVICE CARD

A chalkboard with cursive handwriting in white chalk. The text on the board is partially obscured by a yellow rectangular box in the center. The visible text includes "to the", "home. He", "it was", and "that she fo". At the bottom of the chalkboard, there is a wooden tray containing a piece of white chalk and a small, dark, rectangular object.

**Any word processor
can write.**

New PerfectSense™ technology actually makes sense of your words. So it can do things **LIKE REWRITE SENTENCES**. Because new WordPerfect can read, it improves the way you write.



Most word processors are pretty simple. You type, it puts letters on a screen.

But now there's PerfectSense.™ An amazing new technology that allows WordPerfect® to make sense of what you write. In other words, it reads. Quite simply, it'll make you a better writer.

Take our exclusive new grammar checker—Grammatik® 6. It's

the smartest and most useful ever. Instead of just offering grammar "advice," it can actually rewrite entire

**Only WordPerfect
can read.**

sentences for you. And because it understands your words and their context, it catches more mistakes.

What's more, PerfectSense lets you find and replace all the different

"forms" of a word simultaneously. For instance, change "go," "goes" and "gone" to "fly," "flies" and "flown" at the touch of a button.

PerfectSense will even correct your most common spelling, spacing and typing errors as you type. So you don't have to take time to change "adn" to "and" or fix capitalization errors. Like this.

PerfectFit
with PerfectOffice®

Remember, WordPerfect is also a very important part of our new PerfectOffice™ integrated suite of applications. And no one can convert your existing WordPerfect files and macros like we can.

So call 1-800-526-2310 for more information on the only word processor smart enough to write this ad. And read it.

It can rewriting your sentences for you.

It can rewrite your sentences for you.



WordPerfect®

NOVELL



**Any spreadsheet
can crunch numbers.**

Introducing the all-new
Quattro Pro. It's more
 of what you're looking
 for in a spreadsheet.
Power. Ease of use. And
GREAT-LOOKING NUMBERS.



Why simply crunch numbers?
 When you can graphically ana-
 lyze, visualize and present them
 with all-new Quattro® Pro. It
 makes your numbers really shine.

We give you more ways
 to look at your data than either
 Lotus 1-2-3® or Microsoft®
 Excel. And Quattro Pro does
 most of the work for you.

Intelligent Graphs automatically

choose the
 best graph
 for your type
 of data. Graph
 Galleries for-
 mat it beauti-
 fully. And
 Quattro Pro's

**Only Quattro Pro
 can polish them.**

revolutionary Presentation Advisor suggests the ideal presentation style.

But Quattro Pro does more than make your numbers look great. It's the
 perfect combination of power and ease. Take our new Budget Expert, for
 example. It creates custom-tailored, fully formatted
 business and personal budgets in seconds. Try that in
 any other spreadsheet!

PerfectFit
 with PerfectOffice™

	Quattro Pro	Lotus 1-2-3	MS Excel
Automatic Experts	30	0	3
Graphics Advisors	YES	NO	NO
OLE 2.0	YES	NO	YES
Formula Composer	YES	NO	NO
Toll-Free Support	YES	NO	NO

And our exclusive new Formula Composer makes creating
 formulas a breeze. We even have over 20 Analytical Experts
 that make analysis automatic. So you don't have to be a power
 user to use powerhouse tools.

Don't forget, new Quattro Pro is completely integrated with
 WordPerfect®. They look the same. And work the same. Just
 like all the products in our new PerfectOffice™ suite.

New Quattro Pro. It's powerful. Graphical. In a word—polished. To see
 how it makes your numbers look, call 1-800-526-2648 today.



Quattro® Pro

NOVELL



**Barbara Stump
Network Administrator
Systech Environmental Corporation:**

"In the decade or so since WordPerfect defined what customer support means to software users, we've come to depend on WordPerfect's customer support for quick, reliable answers.

"In fact, customer support is still one of the big reasons why WordPerfect, the Novell Applications Group, is different from other desktop applications companies. With over fourteen years of experience helping their customers, you could say they've learned a few things about finding solutions that improve customer productivity. And because WordPerfect has been committed to personalized customer support from day one, we know we'll continue to get the best customer support in the industry."



**For a free brochure
on WordPerfect's
customer support
options, call
800-526-4894**

**Discover what WordPerfect
customer support can mean for you.**

And now, as part of Novell, WordPerfect offers even more options to find the solutions you need. You still get the same personalized service you've come to expect in the past, but now you have access to the combined resources of Novell and WordPerfect.

To find out more about the industry's best customer support, call for our free brochure: (800) 526-4894.

"WordPerfect has always had the best customer support. And now it's getting even better."

BARBARA STUMP, SYSTECH ENVIRONMENTAL CORPORATION

 **WordPerfect**

Novell Applications Group

Letters

IT'S NOT A SECRET ANYMORE

John C. Dvorak's column "Sex On-Line: Shhhhh, It's a Secret" (June 28, 1994) concurs with my observation that university students are spending a good deal of time on the Internet Relay Chat (IRC) system. It would seem that we've all needed a means to expend some sexual tension, and the IRC has provided that outlet. Cybersex is so popular because it has—so far—avoided the stigma usually attached to any frank and mature exploration of the sexual self.

*Raymond R. King
via the Internet*

Within minutes of receiving the manual for my Internet account, I had a list of all the "dirty" areas. By the end of my first evening of prowling, I had FAQs (Frequently Asked Questions) that identified these dirty areas as being some of the most popular on the Internet and also statistics as to the fraction of bandwidth taken by them.

*Ken Plotkin
via the Internet*

One of my coworkers brought in a copy of *PC Magazine* last week, dropped it on my desk with a grin, and announced that he "knew" why I'd become so addicted to America Online. I must say that I read Dvorak's column with some dismay. Who knows how many people might take what Dvorak wrote seriously? Dvorak's article, of course, was amusing, but as an admitted on-line addict, I object to Dvorak's characterization of the entire on-line community as sex-crazed.

*Jaye Knickerbocker
via PC MagNet*

PCs FOR YOUR LITTLE RASCALS

As a former middle school science and computer teacher and the father of two preschoolers, I found Michael J. Miller's column "Big PCs for Little Rascals" (June 28, 1994) of great interest. Miller discusses the attraction kids have to computers, pointing out the appeal of the computer's interactivity as compared to the passive nature of television. However,



Cybersex is a harmless outlet for expressing ourselves and having some fun.

I would argue that being interactive is not enough to validate the time a child spends on a computer.

We as parents should not indulge children with electronic stimuli at the expense of other, more traditional growth activities—such as reading a book, building with blocks, or even playing with other kids. Parents must be aware of when the computer crosses the line and becomes just another source of entertainment disguised as an educational activity.

*Scott Greer
Portland, Oregon*

ON-LINE PROSE IS NOT ALL ROSES

Has Robin Raskin (Pipeline, "Have You Hugged an Editor Today?," June 28, 1994) recently examined the impoverished writing that passes for communication on most on-line services? Editors should have no fear: their jobs are safe. The information available on on-line services has its purpose, but nothing can replace the look and feel of the printed page. Nor can anything replace the clear, concise writing found in magazines such as this one, in which editors pay careful attention to the written word.

*William Saal
via PC MagNet*

PCMCIA'S GROWING PAINS

Bill Howard ("Nice Try—Now Try Harder," June 28, 1994) has really hit the nail on the head with his comments about PCMCIA modems. PCMCIA products have a long way to go in terms of physical construction.

When I travel, I'm continually logging in to check the status of my network and read my mail; PCMCIA modems cannot withstand that kind of use. Every portable computer should have a built-in RJ-11 jack and an internal modem, not a confusion of fragile cables that have to be carefully positioned and protected during use to avoid damage.

*Louie Scribner
via the Internet*

Howard's column is rather puzzling. The PCMCIA modem is just about the only recent PC peripheral "experiment" that hasn't failed. Sure, there are lots of good reasons not to use a PCMCIA modem: It takes up one of your slots; the driver software is usually cryptic; dongles are an unacceptable evil. But when my 14,400-bps PCMCIA modem inevitably becomes obsolete, I will simply pull it out and replace it with the next generation of modems.

*Seth Meyers
via PC MagNet*

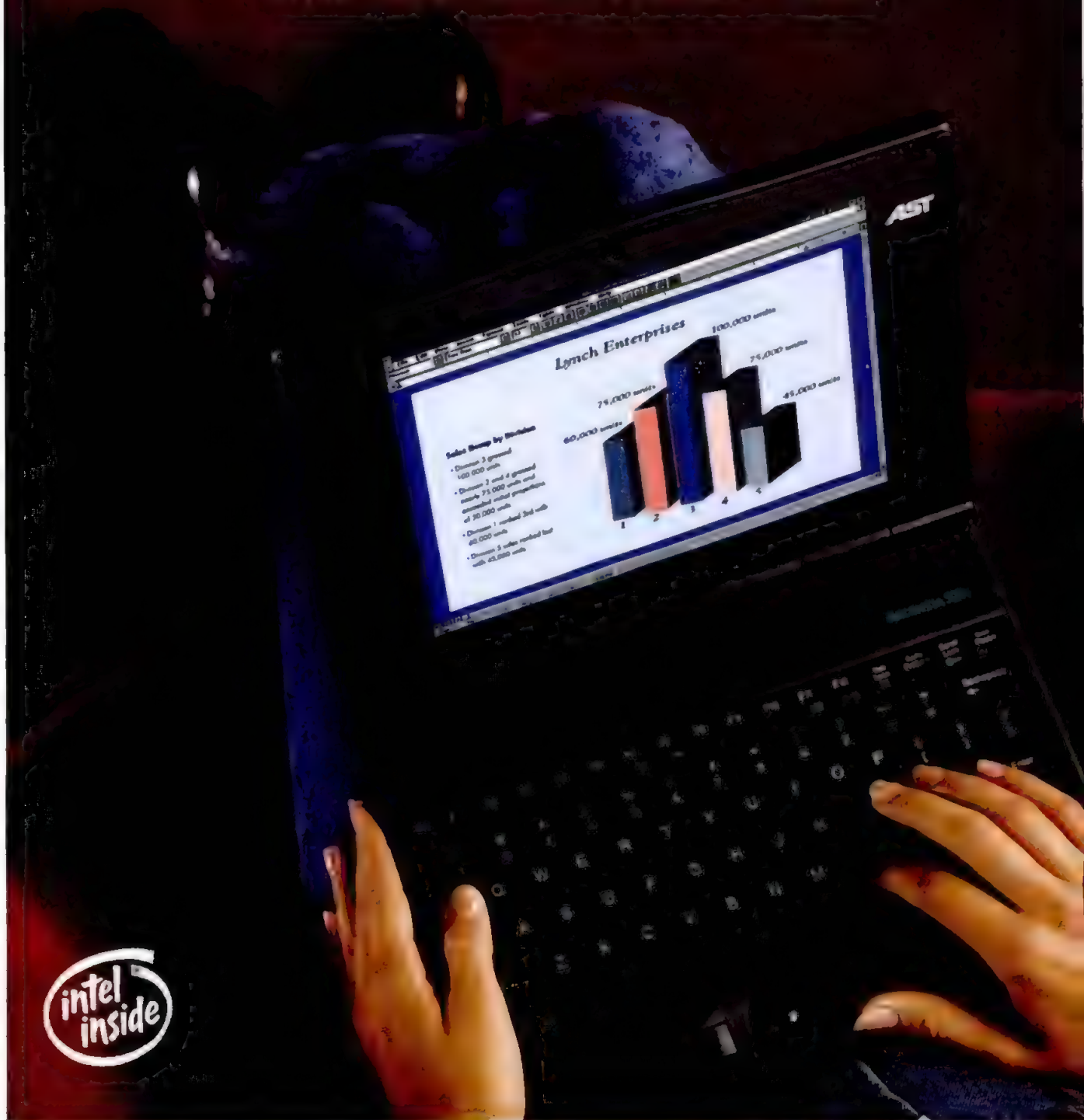
Howard has put forth an outstanding column on PCMCIA modems. I agree with his assessment entirely. If enough people voice their opinions about this issue to the vendors, perhaps we can get them to change.

*Marcia Wolff
via the Internet*

By insinuating that the U.S. market is the only market that's important, Howard promotes the stereotypical attitude that Americans should ignore the rest of the world and the rest of the world should become American. And as a Canadian, I'm well aware of how Canadians are constantly bombarded with manifestations of this message.

*Stephen M. Dunn
via the Internet*

A MAJOR BREAKTHROUGH IN SUBNOTEBOOKS: ONE YOU CAN ACTUALLY USE.



IT'S EASY TO MAKE A LIGHTER, smaller notebook. You just make everything a bit smaller and then remove all the features that aren't absolutely necessary.

Unfortunately, what you're left with is so difficult to use, it defeats the purpose of having a notebook in the first place.

The Ascentia™ 500S sub-notebook is very different. A breakthrough, in fact.

It's light. It's small. Yet it still manages to have the largest display in its class, so it's a lot easier to see what you're working on. With the full-size keyboard, your fingers will know right where the keys are for effortless touch-typing.

Like every other Ascentia, the 500S has two PCMCIA slots

and local bus graphics. Plus an external floppy drive is standard.

We've also included AST Works™-Mobile Edition. A unique interface, designed especially for the traveling professional, which gives you easy access to the host of mobile computing software

that's been pre-loaded onto the Ascentia 500S. So you're up and running right away.

As far as we're aware, subnotebook users don't have smaller fingers or better eyesight.

Should you ever need it,

there's plenty of backup.

A 3-year limited worldwide warranty*, a year of 48-hour rapid repair service,** and a highly responsive around-the-clock telephone support line.

Bottom line, just about the only thing we've left out of the Ascentia 500S is weight. As you'll find out if you call 800-876-4AST.

YOU'LL LIKE THE WAY WE WORK™

Ascentia 500S

Intel 486SX/33MHz processor (3.3 volt)

9.5" diag. Dual-Scan STN color display

32-bit Local bus video

250MB or 340MB hard drive

External 3.5" floppy drive included

4MB RAM standard, expandable to 20MB

2 Type II or 1 Type III PCMCIA slots

SmartPoint 19mm trackball

NiMH battery: 2-3 hours battery life

7.7" (d) x 10.4" (w) x 1.5" (h), 4.5 lbs.

Pre-loaded with AST Works Mobile Edition

AST.
COMPUTER

LETTERS

REMOTELY CONTROLLED

The August 1994 review of remote-control software ("Remote-Control Software: How to Be in Two Places at Once") contained comments about CoSession for Windows that were unwarranted and inaccurate. *PC Magazine* states that CoSession "seems to have a stronger connection with the past than the future."

This statement implies that Triton has

done nothing to enhance CoSession. However, CoSession for Windows features 14 major enhancements, including drive redirection, new Windows driver technology that eliminates the need for modifications to display and mouse drivers, a new compression algorithm that significantly increases performance, high-resolution graphics support, and advanced security features.

CoSession is designed and continually enhanced to meet the needs of our corporate customers. Had *PC Magazine* made a better effort to understand the criteria of

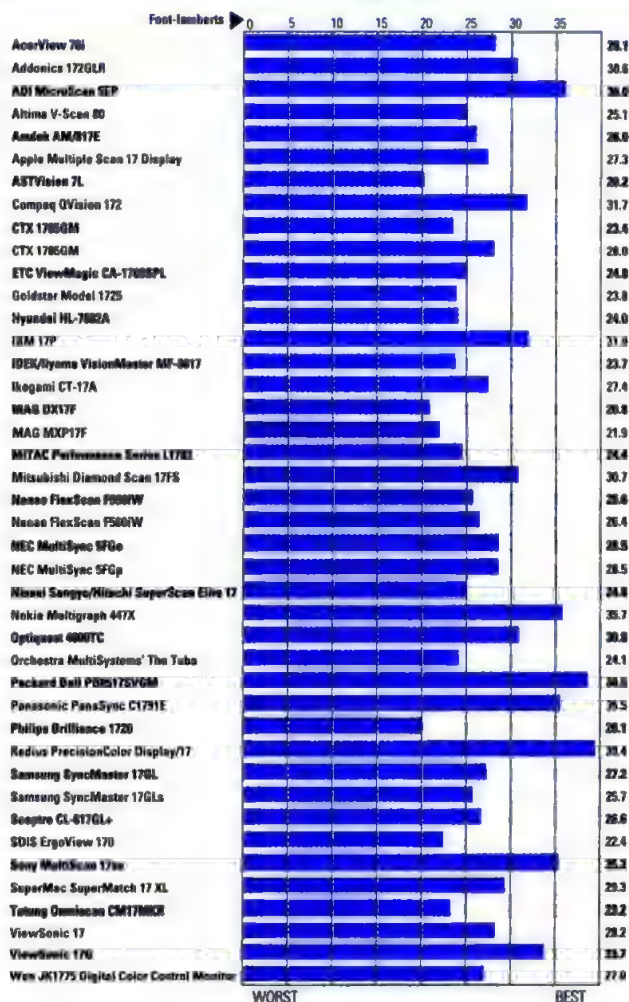
the corporate audience for remote-control products, CoSession would have been reviewed in a more positive light.

Kathy Kraiss, Director of Marketing
Triton Technologies Inc.
Iselin, New Jersey

• While accurate, our review certainly could have emphasized CoSessions' new features. We will review the new version in *First Looks* shortly, and we'll probe the corporate issues of remote computing in an upcoming issue of *PC Magazine*, Network Edition.—Ed.

CORRECTIONS AND AMPLIFICATIONS

MAXIMUM USABLE BRIGHTNESS



Maximum Usable Brightness is a measure of the screen's brightness at the point before the MTF (sharpness) value begins to drop. Although a maximum usable brightness of 20 or more foot-lamberts is acceptable, a higher number means that you can fine-tune images more easily for different lighting conditions.

In "17-Inch Monitors: The Bigger Picture" (*PC Magazine*, September 27, 1994), the benchmark test chart for Average MTF (modulation transfer function) was accidentally repeated as the Maximum Usable Brightness chart. On the left is the correct Maximum Usable Brightness chart.

In the same article, the review of Nissei Sangyo America/Hitachi's SuperScan Elite 17 incorrectly summarized the unit's test performance. We said it had average or below-average scores on all our benchmark tests except one. In fact, it was above average on three tests, average on one, and below average on one. Our conclusion stands: You get "excellent features" and "average performance."

The photo illustration for the story "Desktop Presentations: Captivated Audience" (September 27, 1994) should have been credited to Douglas Levere.

The correct toll-free number for Sharp Electronics' OZ-9520 Wizard modem (*First Looks*, "...And One for Your Pocket," September 13, 1994) is 800-237-4277.

The price of National Geographic's Picture Atlas of the World mentioned in Jim Seymour's column "Pretty Good CD-ROMs" (September 13, 1994) is actually \$99, not \$143 as reported.

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send correspondence to Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802. You can send electronic mail to our Internet address, 157.9301@mcimail.com, or you can upload it to PC MagNet (see page 12 for access information). You can also send e-mail to individual editors. Type GO PCMSTAFF on ZiffNet for a list of addresses. All letters become the property of *PC Magazine* and are subject to editing.

WHAT HAPPENS

WHEN YOU ADD **SIZE**

TO AN ALREADY

EXTRAORDINARY PACKAGE?

WHAT DO YOU THINK?



At 7 feet 2 inches tall, Kareem Abdul-Jabbar has got some serious size. But that's only half the story. The fact that he added superior basketball skills to an already imposing frame is what made him a dominant force in the NBA for two solid decades.

The new ergonomically and aesthetically designed Elite series of monitors from MAG InnoVision have features that other monitors just can't touch. And the fact that they only come in the larger 15-inch, 17-inch and 21-inch sizes with the most advanced CRT technologies makes them truly fantastic. Advance Display Calibration, Green Energy and LCD displays combined with ultra high resolutions up to 1600 x 1280, lightening-quick refresh rates and crystal clear dot pitches make them impossible to beat. And since they're so reliable, we'll even throw in a 3-year limited warranty.

So pick one up at a MAG InnoVision dealer near you. Their larger size and imposing features are liable to dominate the market for years to come and they cost a lot less than, say, an NBA draft pick these days.



See Kareem at COMDEX/Fall '94, Booth #L290.

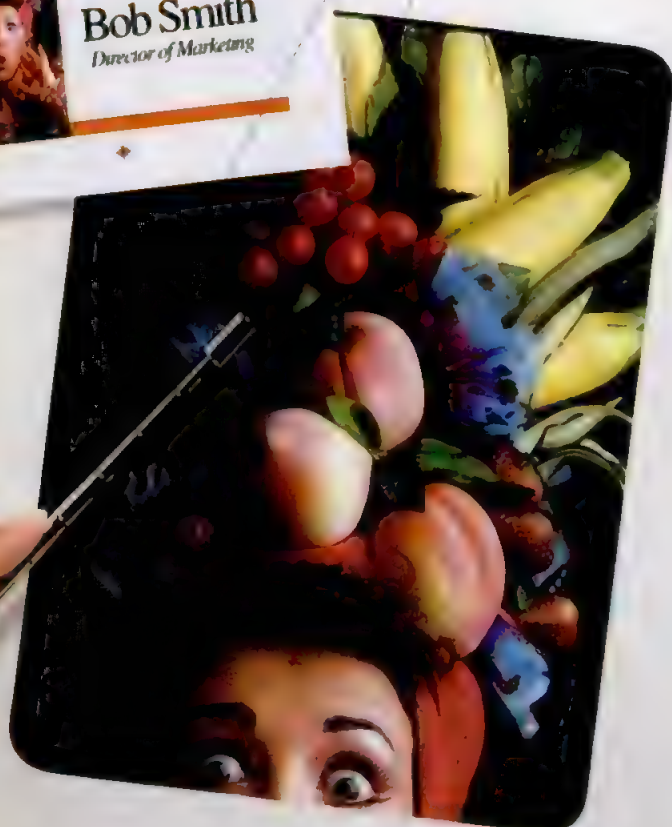
2801 South Yale Street • Santa Ana, California 92704 • 800-827-3998 • 714-751-2008

CIRCLE 067 ON READER SERVICE CARD



Prints on plain paper. Dual media tray
option switches from your desktop.

Get colorful overheads. Up to 600 dpi.
Up to 2 pages per minute!



Tektronix

Vibrant color prints
and comps on any
paper, vellum to
cover. Big ideas?
Bull's-eye.
Full-bleed tabloid.
Print both sides
a page a minute.
30 cents a page.
No bull.



Color is color, until

Then you'll choose Phaser™ Color. For all the colorful things you do in business, graphic arts, science, or engineering—Tektronix offers one-stop shopping. With more solutions than any other printer manufacturer. So there's sure to be a Tektronix Phaser™ color printer that fits your

requirements to a tee. No matter which Phaser series you choose, each handles your workgroup's toughest demands. All Phaser color printers offer:

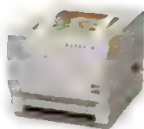
- 300 dpi or higher
- Level 2 Adobe™ PostScript™
- Letter-size prints or transparencies
- Support for PCs, Macs, workstations and nets—simultaneously



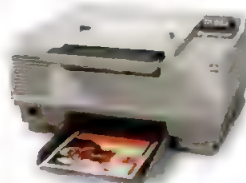
Phaser 200e



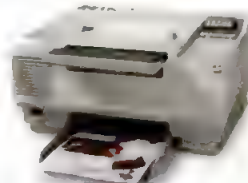
Phaser 220e



Phaser 220i



Phaser III PXi



Phaser 300i



Amazing photorealistic color,
full-page or tabloid-bleed.

Matchless pre-film proofs
for \$5, not \$50.

LRT. Reg'd User No. 94/2072

you shop around.

■ Pantone's color standard ■ RISC-speed print processing ■ TekColor™ controls ■ A Tektronix one year warranty ■ Top technical support.

That's the baseline. Now select a printer that lays down any color on any paper. And makes prints that look like color photos.

Or choose the world's fastest color printer. All these outstanding color features come from Tektronix, the Fortune 500 leader, where quality in workgroup color printers starts at only \$2,995 and innovation never ends.



Phaser 1150X



Phaser 440



Phaser 480

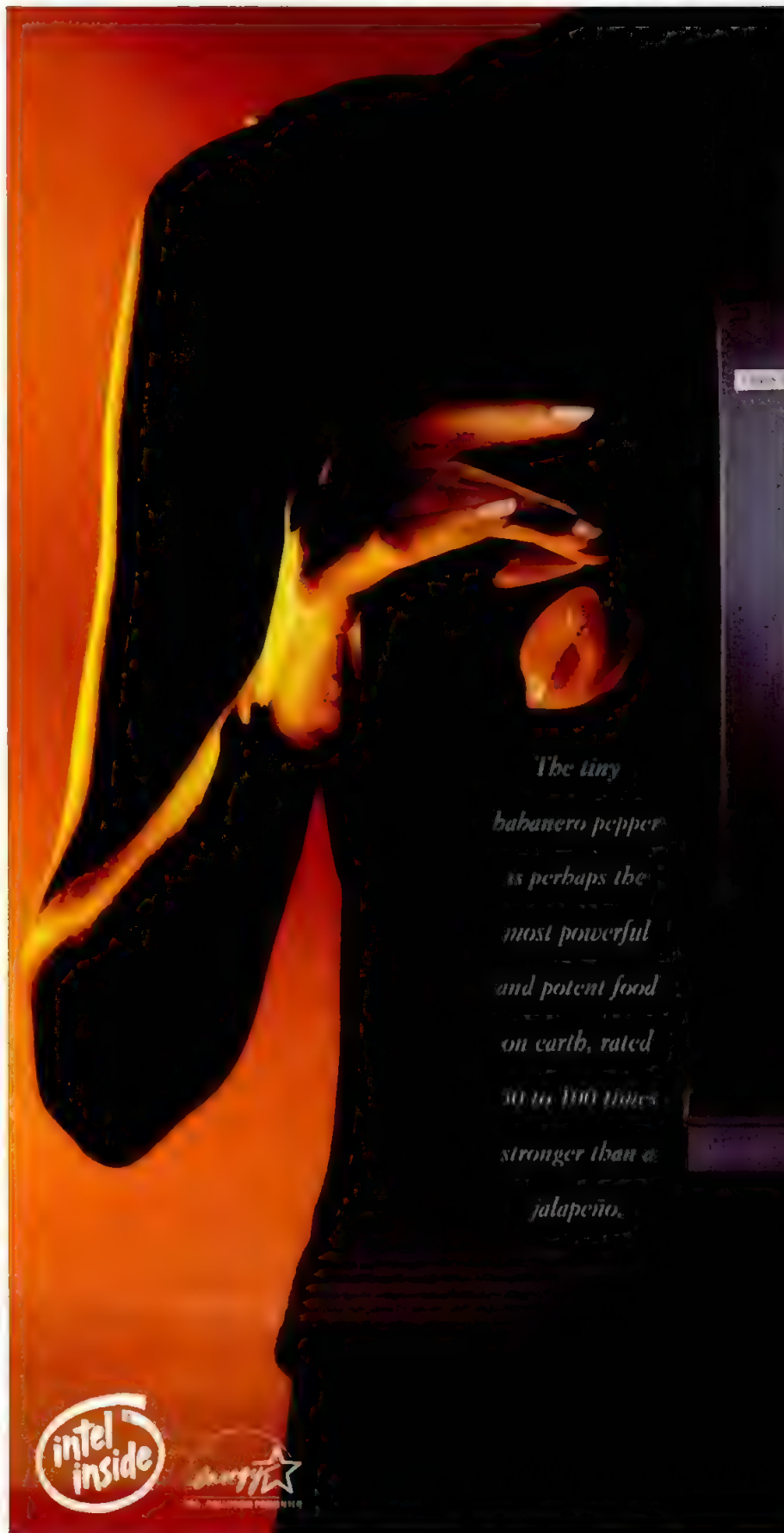
Tektronix

Free output sample, call 800/835-6100, Ext.1023.

© 1994 Tektronix, Inc. All rights reserved

CIRCLE 001 ON READER SERVICE CARD

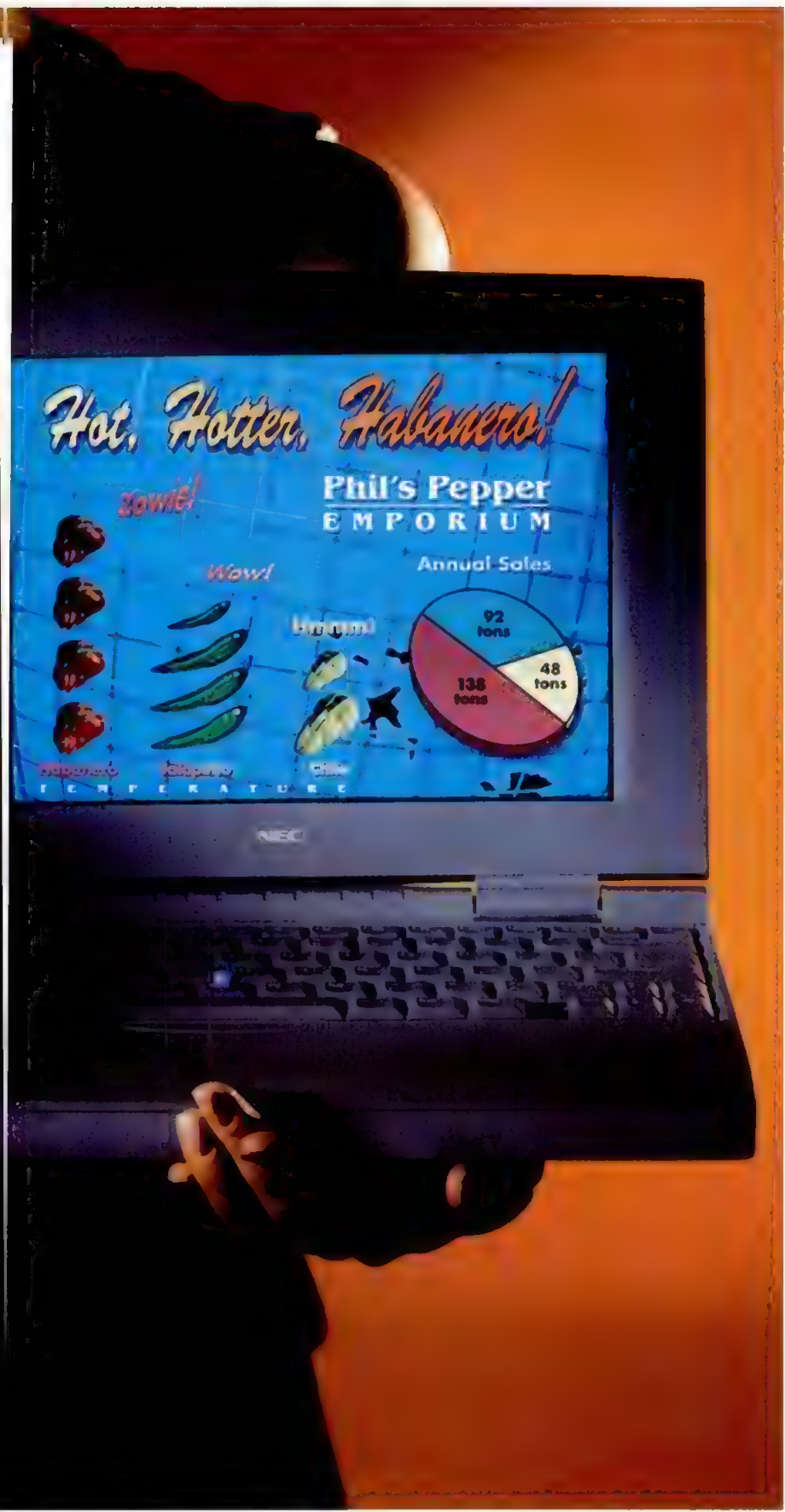
ONLY
MOTHER
NATURE
PACKS
MORE
POWER
INTO SUCH
A SMALL
PACKAGE.



*The tiny
habanero pepper
is perhaps the
most powerful
and potent food
on earth, rated
30 to 100 times
stronger than a
jalapeño.*



Versa is a trademark of NEC Technologies, Inc. The Intel Inside logo is a registered trademark of Intel Corp. All other trademarks are the property of their respective owners. The Energy Star emblem does not represent EPA endorsement of any product or service. * Versa S monochrome model © 1994 NEC Technologies, Inc. NEC GSA #G500K91AGS3241



Here's a hot little number guaranteed to set your imagination on fire.

Presenting the Versa™ S notebook computer from NEC.

VERSA = VERSATILITY

Perhaps the most powerful notebook pound-for-pound (actually, starting at about 4 lbs.*) on earth, thanks to the availability of an i486™ DX2/50 processor with on-board local bus video, up to 12 MB RAM and 260 MB hard disk storage. The Versa S is, in dimension, no larger than a piece of notebook paper. But that didn't stop us from packing it with an unusually long list of standard features. Choose from a brilliant 9.5" color TFT, enhanced color DSTN or monochrome LCD display. It features a large keyboard with an accurate



SurePoint™ pointing device,

PCMCIA Type III capabilities, serial, parallel, SVGA and keyboard/mouse ports. Yet, it folds to a svelte 1.4* inches. For more information, call



1-800-NEC-VERSA or visit an authorized dealer. The Versa S notebook. It's got the kind of powerful leick that would impress even Mother Nature.

**SEE, HEAR
AND FEEL THE
DIFFERENCE.**

NEC

If you've ever owned a copy of Norton Utilities[®], you know you don't need a super-hero's cape to have magic-like powers.

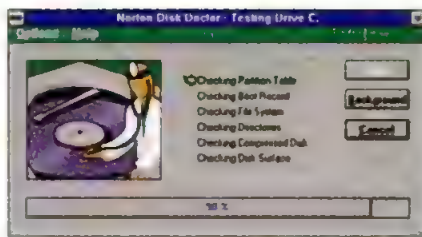
Famous for its daring rescues and recoveries, Norton Utilities is one of the most honored software programs in the history of personal computing. And now there's new Norton Utilities 8.0.

The first software package to combine true Windows recovery

Like Speed Disk,
Norton Disk Doctor
runs in the background.

and repair in one
great package.

Our new System Watch monitors virtually everything going on within your Windows environment. What's more, it provides real-time crash protection by alerting you to any

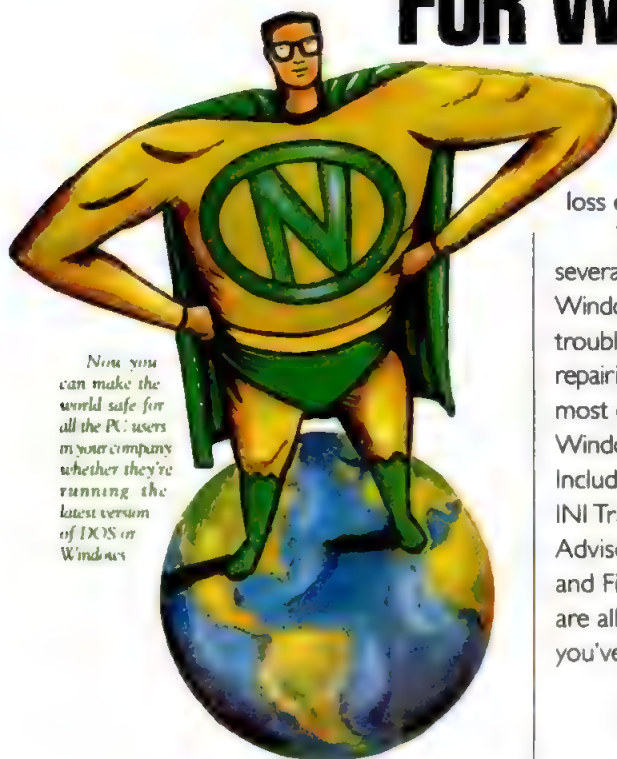


complete diagnostic tool set for analyzing all of your computer's hardware

components from drives to video.

There's also our new Interrupt Conflict testing to help eliminate conflicts and their subsequent lock-ups and to make it easier for you to

AFTER YEARS OF SAVING DOS USERS, NOW YOU CAN MAKE THE WORLD SAFE FOR WINDOWS, TOO.



Now you can make the world safe for all the PC users in your company whether they're running the latest version of DOS or Windows

potentially dangerous situations that could result in system failure and the loss of your data.

There are still several other new Windows utilities for trouble-shooting and repairing even the most challenging of Windows problems. Including INI Tuner; INI Tracker; INI Advisor; INI Editor and File Compare. And there are all the classic DOS utilities you've come to rely upon.

A MONUMENTAL NEW UPGRADE.

and configuration management with proven DOS protection and recovery tools.

Whether you or someone you know is having hardware problems, file system problems, DOS or Windows OS problems, Norton Utilities 8.0 gives you all the tools you need for diagnostics

Both Speed Disk[™] and Disk Doctor[®] now operate in the background. Providing continuous disk optimization and file system analysis and repair.

You'll find support for the widest range of compression formats under both DOS and Windows. In addition, there's a

install new devices on your system.

It all adds up to a major upgrade that InfoWorld rated a staggering 9.4 out of 10 in their May 9, 1994 review.

And, if you are one of those MIS super-heroes, ask about our new Norton Utilities Administrator[™]. It's the fast and easy way to distribute Norton Utilities 8.0 to every desktop in your office.

Just zap on over to your local computer retailer or visit your software store today.

Or to receive more detailed purchasing information, call us at 1-800-628-4777, ext. 9152.*

So for maximum protection, always boot your PC with Norton Utilities 8.0 at the start of your day.

It'll make your world a happier and safer place.



The pioneer of data protection and recovery brings you the new improved Norton Utilities 8.0.



SYMANTEC.

*For more information in Canada, call 1-800-667-8661. Symantec, Norton Utilities and Norton Disk Doctor are registered trademarks of Symantec Corporation. Norton Utilities Administrator and Norton Speed Disk are trademarks of Symantec Corporation. All other brand names or trademarks are the property of their respective holders. ©1994 Symantec Corporation. All rights reserved.

Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

Wiring the Telecommuter

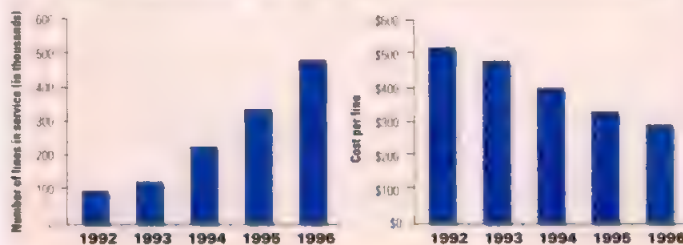
ISDN service is on the upswing

Phone companies, prompted by deregulation in the telecommunications industry and a taste of competition, are pushing ISDN service like never before.

The best link between your PC and the outside world, Integrated Services Digital Network is the public phone network's next-generation technology. An improvement over the currently unpredictable analog network, ISDN provides consistently clean and fast (128 Kbps) digital circuits for voice, data, and video applications. It also supports multiple devices over the same circuit so you can connect your phone, videoconferencing system, and computer to the same ISDN link. With ISDN, you can connect from home to your office

Gearing Up for ISDN

Over the next few years, the number of ISDN lines that provide 128-Kbps digital circuits is expected to rise, while the cost of these lines is expected to drop.



"Betting on the Dream.")

"The regional Bell operating companies are awake now," says Henry Matthes, principal analyst at market research firm Dataquest. "The phone companies were hesitant to implement ISDN, because there wasn't enough business. And because there wasn't enough business, rates were too high." ISDN service has always been difficult to implement, but that's changing now that phone companies are introducing residential rates. California's PacTel now offers a residential ISDN rate of \$23 per month; its commercial rate is about \$70. Bell Atlantic says it can install ISDN service to homes in the

Washington, D.C. area within five working days for \$132 and a monthly rate of \$36.

Software makers are now developing standards for videoconferencing software, a key to widespread use of ISDN service. Intel and AT&T recently announced that they'll co-develop videoconferencing products for debut in 1995 and establish interoperability among existing products. Says Frank Gill, general manager of

network at high speed, share documents, and videoconference. (For more information, see the ISDN story in this issue

Intel Products Group, "The business call of the future will be a conference call from your PC."—Robert Lipschutz and Carol Levin

Are You a Candidate for ATM?

CHANCES ARE YOU'LL BE AN early adopter of asynchronous transfer mode if you're a network manager who fits this profile: You have at least 500 PCs on your LAN; you run multimedia, imaging, or computer-aided design applications; you plan to lease T-3 lines for carrying video over a wide area network; and you communicate heavily with remote locations.

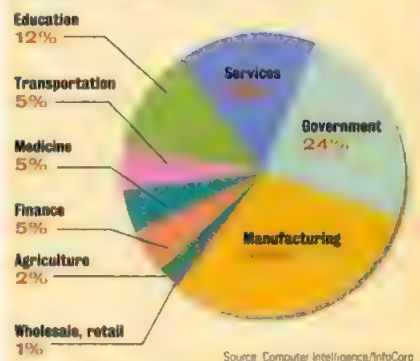
Prescribed as the treatment for a bad case of LAN traffic congestion and overload, ATM is the most talked about network architecture for connecting wide-area and local-area networks. Now, developers of ATM hardware are cutting prices, and the ATM Forum is creating standards for the multilayered protocol so that products from different vendors will work together.

"The future growth of ATM is likely to be driven by a need for a high-bandwidth highway to carry applications that incorporate multimedia, video, and bit-mapped images," says Stan Schatt, director of LAN service at market researcher Computer Intelligence/InfoCorp, which recently surveyed over 135,000 U.S. companies. In its report, "The CII 500: ATM Edition," CII predicts that ATM will emerge as a corporate backbone but that companies won't abandon their existing LAN topologies. Instead, they'll incorporate less expensive high-bandwidth technology such as 100-Mbps Ethernet. The high-speed (155Mbps) traffic cop linking together several LANs at a corporate headquarters is likely to be an ATM switch.

The report also predicts that by mid-1996

Early Adopters of ATM

Of the 500 organizations identified as most likely to adopt ATM networks, most are based in manufacturing and government.



Source: Computer Intelligence/InfoCorp

ATM adapter cards will drop to \$600. IBM has already made pricing news by announcing a line of adapters at \$395.—Carol Levin

Pipeline By Robin Raskin

The Rating Game

In December, 1993, 100 game manufacturers appeared before a congressional subcommittee to explore the possibility of creating a federal rating system that would apply to video games. Gamemakers went into a tizzy. Rather than succumb to legislative forces beyond their control, they've spent the past year rushing towards self regulation—trying to hammer out a rating code they can live with. Thus far the results are pretty amusing, but they pose some serious questions about what we want rated and how.

The two main players in the Rating Game are the powerful ISDA (Interactive Software Developers Association) and the



Computer Game Ratings Workshop Group (a subset of the Software Publishers Association). ISDA members include heavy hitters from the cartridge-based world: Sega, Nintendo, Acclaim, and others. Their scheme is to have game publishers submit a videotape of the "suspect" aspects of play for a rating, plus \$500 to an ISDA-approved rating board. The raters,

chosen by the member organizations, would include parents, educators, and child development experts. The ratings would be age-based ("children 12 and older") and augmented with value-judgment comments such as "needless blood and gore" (this begs the question, "When is blood and gore necessary?").

The Computer Game Ratings group, nervous about sharing a rating system with the cartridge games, prefers creating its own

board made up of software developers, publishers, teachers, and parents. Publishers would pay a sliding fee to submit their game before the board; they would answer a set of survey questions such as "Does this title contain any violence that results in auditory distress by a sentient object?" Based on the answers to such thought-provoking questions, the game would receive a score on a five-point scale in the areas of violence, nudity/sex, and language. This matrix could get quite complicated, and I worry that some publishers may actually use the questionnaire as a formula for their next hit game.

Of course there are those who say each company should be responsible for rating its own contents. But in the case of Apogee's *Wolfenstein*, which the company dutifully rated as "PC-profound carnage," the rating turned into a sales-generating self promotion. You can imagine that there'll be negotiations for ratings as well: "If I change the bloodcurdling screams to whoopees and dress the woman in a bikini, will that take care of our little problem?" It's the old "How close to X-rated can you get without crossing the line?" routine. Others argue that magazines like ours should be the sole raters, but let's face it, people occasionally buy products without reading reviews.

Ratings systems are one sign of a maturing mass-media industry. Ultimately, one rating system will prevail, and it will become as well understood as the PG-13 movie. With any luck, the system will be rooted in common sense and will serve as a general guideline, not a titillating come-on, to a game's content. Until then, prepare for round one of the Rating Game—it should add a few more caveats to software packages already plagued by too many disclaimers and requirements.

Robin Raskin is editor of PC Magazine.

Computing Without Borders

THE ASCII ERA IS COMING TO AN end, and the Unicode era is about to begin. When it does, the era of fully international computing will be underway.

Today's operating systems understand only 256 different characters—barely enough to include all the letters and punctuation used by western European alphabets. Tomorrow's Unicode-enabled systems will let you use up to 65,000 different characters—enough to cover all the alphabets of all the world's languages, with a few thousand other symbols thrown in.

Unicode is built into Windows NT now and will become the desktop standard when it arrives in one of the early releases of Windows 4.x. Applications that let you put Unicode to work will follow soon after. Borland, IBM, Lotus, Microsoft, and WordPerfect are active members of the Unicode Consortium, which is setting the Unicode standard and devising ways to smooth the

transition from ASCII. You won't have to throw out your existing applications and fonts, because the first 256 characters in the Unicode set correspond to the 256 characters in the Latin-1 set.

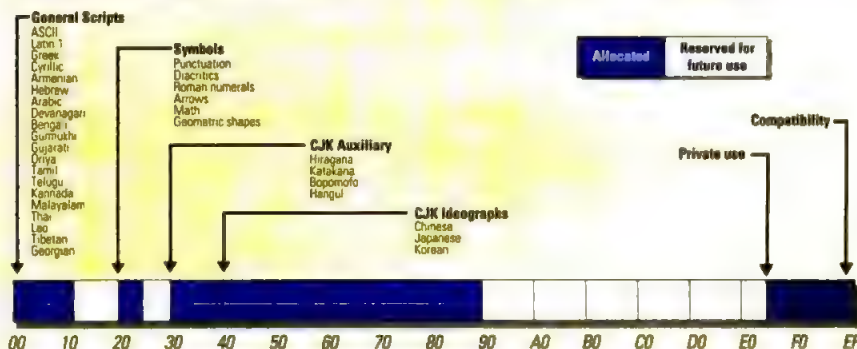
When Unicode-enabled applications arrive, databases will be able to store and retrieve English, Japanese, Russian, or Viet-

namese text in the same fields.

Today you can add Unicode extensions to Windows 3.1 with Gamma Production's UniType (see First Looks). You'll have to wait for full built-in Unicode support in Windows and its applications before you can work effortlessly with multiple languages in the same file.—Edward Mendelson

All the World's Languages in 65K

The Unicode standard's 16-bit design has room for 65,000 characters and symbols, more than enough to code all the characters used for written communication. The General Scripts area alone codes some 19 languages, while the majority of the space is used by Chinese, Japanese, and Korean ideographs. Unicode promises to make multilingual software easier to write and international information exchange more practical.



Color Reflections

REFLECTIVE LCD PANELS, SUCH AS those used in the lightweight Hewlett-Packard OmniBook, are lighter and use far less power than the backlit displays in most notebooks but haven't caught on because they're difficult to read in low light. And while notebook buyers are increasingly buying color, reflective displays have only been available in monochrome.

Sharp Electronics Corp. may soon remedy those shortcomings with the introduction of a reflective thin-film transistor (TFT) active-matrix LCD panel that looks clear and bright—even in low light.

The first prototypes measure only 5 inches diagonally and can display a 320-by-240 image in four colors. While rudimentary compared with today's active- and passive-matrix color screens, Sharp's reflective active-matrix LCD display incorporates a number of new technologies. It uses a highly reflective contact called an organic dielectric film, which is deposited on top of the TFTs, a new LCD display mode called

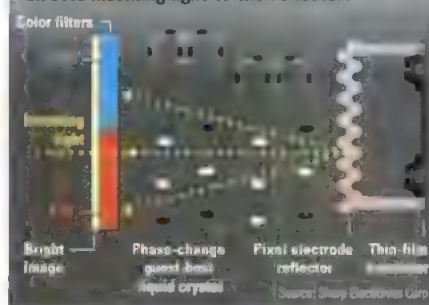
phase-change guest-host, and a color-filtration system that differs from typical TFT LCDs.

According to Sharp, when power is applied to the liquid crystals they change from a helical phase, which scatters incoming light, to an aligned phase, which lets light pass through to the reflector. Colors are determined by a dye pigment in the liquid crystal material. The first panels will be limited to black, white, cyan, and red.

Sharp is already a major player in the LCD panel business and supplies color active- and passive-matrix backlit panels to some of the largest notebook makers as well as color LCD panels for use in projection displays. Since the technologies behind the reflective LCD are so new, Sharp has not said when it will be commercially available.—*Christopher Barr*

A Sharper, Brighter Image

Sharp's reflective LCD has no backlight and uses less power than conventional notebook LCDs. When power is applied to the liquid crystals, they change from a helical phase that blocks incoming light to an aligned phase that directs incoming light to the reflector.



Pentium Notebooks Beat the Heat

HOW DO YOU KEEP A PENTIUM chip cool when it's inside a notebook that's too small for a cooling fan? The latest approach to notebook refrigeration, slated for use in upcoming Pentium-based ThinkPads, is to minimize power usage so that less heat is generated.

A Pentium will quit working when it reaches over 200 degrees Fahrenheit, and conventional heat sinks can reduce the temperature to around 160 degrees. "The CPU should really be no hotter than 95 degrees," explains David Baczewski of Pico Power, a controller maker recently bought by Cirrus Logic. To solve the problem, Pico Power designed the Golden Gate Pentium Interface Controller, a power management chip that sits next to the Pentium and keeps an eye on the clock. When power is full blast for too long, it "throttles the clock" by changing the frequency of the CPU's

clock on a nanosecond basis. With the CPU drawing less than one watt, the temperature drops to a more comfortable 95 degrees.

"For the most part, applications don't

require the full bandwidth of the CPU," explains Baczewski. "The CPU is really required to run at maximum frequency [speed] only about 10 percent of the time. In some cases, the chip can detect if there's no bus activity and stop the clock entirely," reducing battery drain as well as heat.

Pico Power doesn't solve the whole problem. Baczewski points out that, "On our own, we can't fully control all the heat. System manufacturers will have to take extra measures."

Inventors have come up with an assortment of exotic liquid-cooling and heat-transfer techniques designed to prevent powerful notebooks from melting in your lap. Some methods use a liquid coolant that pulls excess heat off of the chip, much like a radiator in a car. Oasis, developed by Aavid Laboratories in South Lancaster, Massachusetts, uses a tray filled with a 3M fluorocarbon on top of the CPU's heat sink. As the Pentium heats up, the fluid boils and a tube ferries the vapors to a condenser, where they're cooled and condensed back to a liquid. A second tube drains the liquid to a holding tray. Another

approach, used by Twinhead, uses a miniature thermostatic fan on top of the heat sink to draw the hot air out a vent located near the keyboard.—*Carol Levin*

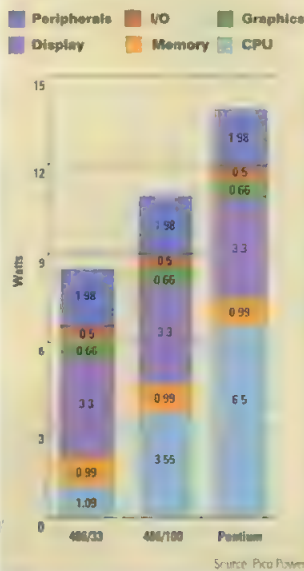
Top Retail Software

Current ranking	Last issue	Product/company
1	2	MS-DOS 6.22 Upgrade Microsoft Corp.
2	—	CorelDRAW 2.0 Corel Corp.
3	7	MS Windows 3.11 Microsoft Corp.
4	1	Procomm Plus for Windows 2.0 Datastorm
5	—	Uninstaller 2.0 Microhelp
6	—	MS Fox Pro 2.6 for Windows Microsoft Corp.
7	—	Lotus 1-2-3 Release 5 for Windows Lotus Development Corp.
8	8	QEMM 7.0 Quarterdeck Office Systems
9	—	Paradox 5.0 for Windows Upgrade Borland International
10	3	WinFax PRO 4.0 Delrina Corp.

This list ranks PC business programs according to the total number of copies shipped to stores and resellers in the week ending August 20, 1994. The list is based on shipments to more than 12,000 retail locations. It does not include sales made directly by software publishers and cannot be interpreted as a picture of the entire software market. Sales information adapted from a compilation by Ingram Micro.

Notebook Power Profile

The Pentium chip consumes more power and generates more heat than other chips. Pico Power's hardware-based technique can reduce CPU power usage to a single watt.



drawn less than one watt, the temperature drops to a more comfortable 95 degrees.

"For the most part, applications don't

Trends

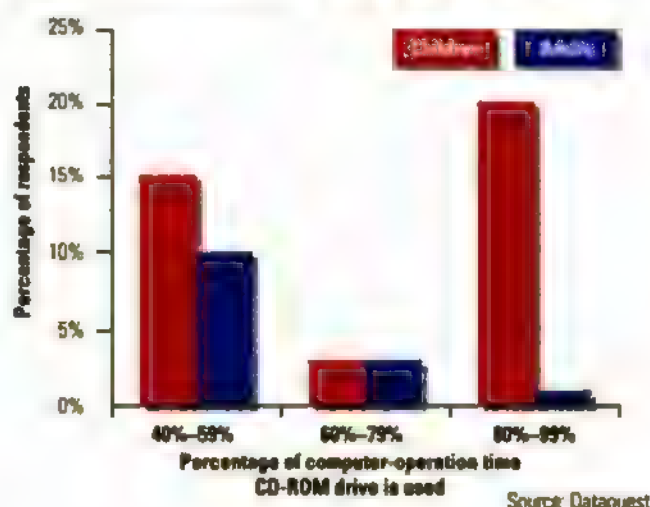
The CD-ROM Generation Gap

WHILE SALES OF MULTIMEDIA PCS with double-speed, internal CD-ROM drives and 16-bit sound cards are booming, sales of CD-ROM titles are trailing, according to a national survey of PC owners. Unlike the rapid-fire purchase patterns of audio CD player owners in the mid-80s, only half of all multimedia-system consumers purchase additional titles, according to market research firm Dataquest.

One reason may be that cost-conscious moms and dads are reluctant to purchase lots of CD-ROMs, finding that kids react to CD-ROMs as they do to other toys—losing interest after a couple of hours. In addition, they consider either the multimedia upgrade or

Kids Rule CD-ROM Usage

The children in the family are the primary users of multimedia PCs a phenomenon largely driven by game and educational CD-ROM titles.



the otherwise costly encyclopedia (often accompanied by popular CD-ROM titles) as free, which then eases the pain of paying extra for a multimedia system. By receiving so much at the outset, people have little moti-

processing and Windows NT—support more than one processor, the development of multiprocessing (MP) applications is gaining momentum. And with many Unix developers working on ports to Windows NT, you can expect more MP applications shortly.

MP software is already used in the sciences. For instance, to model molecular systems that track thousands of atoms, the Argonne National Laboratory, located outside Chicago, has developed ways to easily transfer programs to parallel computers

vation to buy more titles.

Still, there's no doubt that parents are buying multimedia PCs and upgrade kits primarily for their kids, and that the kids of the household are making the most use of CD-ROMs. "The demographics are very traditional—two-parent, two-kid families," says Bruce Ryon, principal analyst of multimedia at Dataquest. The kids are using CD-ROMs three times as much as the adults. "While adults spend only 5 to 10 percent of their time on the computer using CD-ROMs, children spend over 40 percent of their time using CD-ROMs."

Not all analysts agree. Julie Schwerin, a market researcher with InfoTech, disagrees with assertions that sales are mediocre. "Based on our sales data, the consumer segment is very healthy for CD-ROMs purchased beyond those bundled with the CD-ROM drive. The segment will continue growing strong."—Melissa J. Perenson

Software for a Parallel Universe

WRITING APPLICATIONS THAT HARNESS the power of multiprocessor PCs is not an easy task, and that's one reason why widespread adoption of multiprocessing systems has been slow. Now that operating systems—such as OS/2 for Symmetric Multi-

without starting from scratch.

Does MP have a place on the desktop? "MP is a slam-dunk win in any environment where you attach a bunch of users to one machine," says Andy Keane, product marketing manager at MIPS. The first PC-based applications to adopt MP will be database and application servers as well as high-end image manipulation and rendering programs. On some of our PC Labs tests, the multithreaded version of Micrografx Picture Publisher, which allocates CPU-intensive operations to two processors, outperformed previous versions by 80 percent.

Today, a great deal of research is being conducted in the design of parallel programming. "The lack of good parallel processing software languages, tools, and environments makes for fertile areas of research," says Ted G. Lewis, chair of computer science at the Naval Postgraduate School in Monterey, California, and editor-in-chief of *Computer*. Programmers must be keenly aware of hardware design and behavior, language constructs, and operating-system services.

"Today's applications are written with multithreading in anticipation of multiprocessing hardware. Threads are used for hierarchical functions so that background printing will be interrupted for a mouse thread," explains Keane. Existing apps can also be converted to an MP design called multiple instruction, multiple data (MIMD), which breaks down problems into separate pieces that each processor chews on independently. Operating systems such as Windows NT are a natural fit for MIMD systems because NT's thread-based multitasking design can run parallel code segments across multiple processors.—Nick Stam and Carol Levin

Briefs

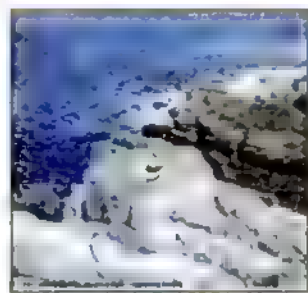
24-HOUR COMPUTER CHANNEL AIRS THIS

fall. Jones Computer Network has expanded its lineup of computer programming with "How to Buy a Computer," "PC Connection TV Superstore," "Going Online," and "Ten Nanoseconds of Fame." The Technology Information Network, recently launched by Ziff-Davis [publisher of *PC Magazine*] and Missing Link Communications, is airing four weekly programs on CNBC and other stations. This season's lineup includes "The Personal Computing Show," "Computer Update," "Inside Technology," and "The Computer Outlet."

THE NATIONAL MUSEUM OF AMERICAN ART

in Washington, D.C., is expanding its virtual museum to include a series of live online conversations with guest hosts. The museum is also making its art collection

available over the Internet: NMAA Online is part of Smithsonian Online (on America Online). For information on NMAA's electronic outreach programs, contact it at 202-357-2247 or nmaa.katie@ic.si.edu.



THE OS/2 TOP TEN LIST IS HERE! BEST-

selling OS/2 apps are Walnut Creek OS/2 Archive, DeskMan/2, GammaTech Utilities, IBM Antivirus, BackMaster for OS/2, OS/2 2.11 upgrade, FaxWorks for OS/2, PM COMM, DCF/2, and TCP/IP Base. Rankings are based on sales by Indelible Blue, a software reseller specializing in OS/2. For a catalog of software, call Indelible Blue at 919-878-9700 or 800-776-8284.—Carol Levin



JetDirect EX External print servers support any parallel-based printer. JetDirect cards support HP LaserJet, HP DeskJet and HP DesignJet printers with I/O slots.

NOS compatibility:
Novell NetWare, IBM LAN Server, Microsoft LAN Manager, Apple EtherTalk, Apple LocalTalk*, Windows NT, Windows for Workgroups, UNIX HP-UX, SunOS, Solaris, IBM AIX, SCO UNIX, Ipd**

Network compatibility:
Ethernet 10Base-T, 10Base2, Token Ring (4/16 Mbps), Apple LocalTalk*

Multiple protocols with automatic switching

Software management utilities such as HP JetAdmin and HP JetPrint^{††} for NetWare and UNIX for easy printer installation, remote status and management

Supports SNMP-based network management software

Flash memory for easy upgrades**

Nothing Supports Your Printers Better Than HP JetDirect Print Servers.

Now you can easily connect and manage the printers in your network environment.

If you've been looking high and low for a way to get all your printers on the network, rest your eyes here for a moment. Because the HP JetDirect family of print servers has a solution that works with

the printers in your company. Not to mention virtually any LAN environment.

And thanks to the software utilities we've included, installation is quick and management of your printers is easy. Plus, you'll

enjoy vastly improved printer performance.

Of course, you'd expect all this from Hewlett-Packard, the leader in

network printing. So give us a call at 1-800-533-1333, Ext. 8464.[†] You'll soon discover that when it comes to sharing printers on a network, nothing stacks up to HP JetDirect print servers.

Another smart networking product from HP.



JetDirect cards connect HP printers with I/O slots

JetDirect EX connects any parallel-based printer



*Not supported by JetDirect EX. **Supported by JetDirect EX, fall of 1994. †In Canada, call 1-800-387-3887, Dept. 8484. ††Supported with Netware only. Microsoft is a U.S. trademark and Windows is a trademark of Microsoft Corporation. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited. ©1994 Hewlett-Packard Company.

THEY NOT ONLY
SOUND GREAT,
THEY PUT PRODUCTIVITY
IN MOTION.



TravelMate™ 4000M Series

- 486 processors from 50MHz to 75MHz
- Active Matrix Color or Dual Scan Color Displays
- Hard Disk Drives: 200MB to 455MB*
- Built-in 16-bit sound
- PCMCIA Type III Slot
- Integrated Pointing Device
- Multiple Interfaces including SCSI II, Audio Controls, and MIDI/Game port
- Intel Indeo™ Video

Portable CD-ROM Docking System

- Double-speed CD-ROM drive (250ms)
- Built-in stereo speakers
- Separate NiMH battery gives you AC or battery-powered operation
- SCSI II connection
- Optional SCSI II bay for additional hard drive

The right multimedia notebook can give you a decided advantage in your work. That's why we made the TravelMate M Series notebook computers.

These powerful multimedia machines give you desktop PC capabilities in a portable package, including the industry's first truly portable, battery-powered CD-ROM Docking System. So you have the freedom to use them anytime, anywhere.

The M Series continue the TravelMates' award-winning reputation for incredible power, performance and reliability. Each comes standard with 16-bit sound, a built-in speaker and microphone, plus a choice of 486 processors to handle full-motion video and speed you through other multimedia applications.

And the optional, battery-powered CD-ROM Docking System gives you access to the growing libraries of CD-ROM software, no matter where you are.

The TI TravelMates. They're for people who are going places.

For more information or the name of the dealer nearest you, call 1-800-TI-TEXAS (1-800-848-3927).

EXTENDING YOUR REACH™



**TEXAS
INSTRUMENTS**



August 1994
TM4000M/25



July 1994

*Depending on model. TravelMate and "Extending Your Reach" are trademarks of Texas Instruments. Indeo is a trademark and the Intel Inside logo is a registered trademark of Intel Corporation. ©1994 TI.
CIRCLE 304 ON READER SERVICE CARD

IMAGINE
HAVING
SUPER
SPEED...

...THE ABILITY
TO REACH
AROUND
THE WORLD...

...AND MORE
UTILITIES
THAN ANY
CAPED
CRUSADER!

YOU'VE BECOME...

**CAPTAIN
ACCESS**



Are you tired of getting sand kicked in your face by remote LAN users? Turn into a real *super* hero — with powers and abilities far beyond those of mortal LAN managers. Become Captain Access.

a speeding bullet, more powerful than a locomotive, and (deep voice) *integrate seamlessly with Novell Netware*. United in a common cause, this dynamic duo will even empower users to read their faxes *remotely*.

THE AMAZING FAX SERVER

Banish interminable fax lines, jammed fax machines and undelivered faxes from your universe forever!

With the Shared Access FAX server™ network users can send and receive faxes directly from their PCs. Instantly. They don't have to be rocket scientists, either — they can fax from within any DOS or Windows application they already know.

They can even use their E-mail to send and receive faxes.

THE INCREDIBLE COM SERVER

It's a bird, it's a plane, it's...whatever you want it to be. The Shared Access COM server™ is an upgradable, *open-platform* communications server. You can turn the COM server into a mail router, make it a remote control station, or set it up for modem sharing — the possibilities are limited only by your imagination.

Both the FAX server and COM server are faster than

GET YOUR FREE CAPTAIN ACCESS UTILITY KIT!

Be a hero. Be Captain Access! Slip into a phone booth and call 1-800-USR-CORP, or mail the coupon below, today. We'll send you all the info you need to become a real superhero and give your Novell Netware LAN *unlimited* power.

I WANT TO
BE A
SUPERHERO

Send me my FREE top secret Captain Access Utility Kit, filled with all the tools I'll need to become...CAPTAIN ACCESS.

Name _____
Title _____
Company _____
Address _____
City _____
State _____ Zip _____
Phone _____

Captain Access, U.S. Robotics, 8100 N. McCormick Blvd., Skokie, IL 60076-2999

PCM 10/25

WINNER
19 94



SHARED ACCESS™

U.S. Robotics
The Intelligent Choice in Data Communications



U.S. Robotics and the USRobotics logo are registered trademarks of U.S. Robotics, Inc. Shared Access, Shared Access FAX server and Shared Access COM server are trademarks of U.S. Robotics. All other brand or product names are trademarks or registered trademarks of their respective companies.

CIRCLE 920 ON READER SERVICE CARD

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

■ Color Printers

Five Ink Jet Printers That Let You Colorize Your Work

BY LORI GRUNIN

Whether it's for a presentation to pitch to a new client, for the kids to create their reports for school, or to put together the year's most elaborate greeting card, ink jet printers are rapidly becoming the printers of choice. Even with the downward price spiral of personal laser printers, sales of ink jet printers are growing faster. That's largely because an ink jet printer offers something a laser printer can't: color.

For less than \$700, you can pick up one of these five color ink jet printers, which are equally suitable for home and small-office use.

EPSON STYLUS COLOR

If your printing needs center on graphics—presentations, illustrations, and images—and you don't mind paying extra for the special paper that is required for printing in 720-dot-per-inch (dpi) mode, then the Epson Stylus Color's vivid output and exceptionally crisp text are hard to pass up.

At 720 dpi, the four-color



GRAPHICS: At a maximum resolution of 720 dots per inch, the Epson Stylus Color produces exceptional images and sharp text.

Stylus is the high-resolution printer in this group. At \$699, it is also the priciest. But this is a

printer whose true peers are the \$719 HP DeskJet 560C and the \$599 Canon BJC-600. The Stylus' 720-dpi output outshines both. There are two reasons for this: Epson's MACH (Multi-layer Actuator Head) technology gives the Stylus superior control of ink-drop placement, and Epson's Microweave mode moves the print head in half increments vertically for finer control and minimal banding.

Under Windows, the Stylus can print 98 characters per second (cps), outpacing its nearest four-color competitor by about 15 percent. At 0.7 color graphics pages per minute (gppm), the Stylus can keep up with the high-powered HP DeskJet 1200C. DOS performance is mixed: At 65 cps, the Stylus is slower than the HP DeskJet 560, but with graphics throughput of 1.6 gppm, the Stylus wins.

Continues on page 38

■ IN FIRST LOOKS

Gamma Productions	
Unitype	42
Accent	42
Matrox MGA Impression	
Plus	44
Bell South Simon	46
Mediatix Audiotrix	46
First Floor Network	
Central	47
DCA Crosstalk with Crossfax	
for Windows	48
deltaComm Development Telix	
for Windows	48
Zenographics SuperPrint	
3.1	50
Shapeware Visio 3.0	50
Intel Smart Video Recorder	
Pro	52
Teneron LegalPoint	
for Windows	52
CheckMark Payroll	
for Windows	54
Road Scholar City Streets ..	56

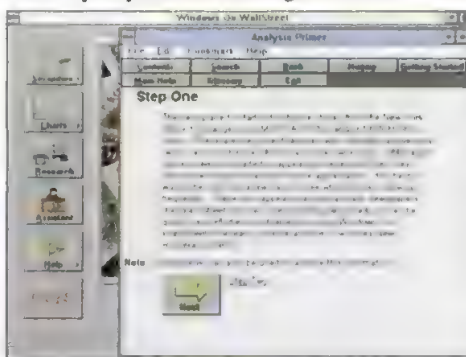
■ Portfolio Managers

Maximize Your Investment Dividends the PC Way

BY CHRIS SHIPLEY

Watch out Wall Street. A stampede of PC-savvy investors is heading your way, and they are interested in only one thing: using their personal computers to make money. Three Windows-based programs, Reuters Money Network (\$25), Windows on Wall Street (\$249), and Money Maker for Windows (\$99), take different approaches to investing, and at least one of these portfolio managers should appeal to every type of investor.

Sure, individual investors can always hunt around on-line for stock quotes and hot research prospects, and through discount



SIMPLE START: Windows on Wall Street opens with a help screen to guide the novice

brokerage firms such as Fidelity and Charles Schwab customers can use their PCs to place trades electronically. But though the PC is the ideal tool for monitoring the ebb and flow of Wall Street, the real savings for PC investors comes from cutting out the broker and trading directly. This spate of Windows-based investment programs aims to make first-time investors market-ready and to arm active investors with the ability to turn hunches into profits.

REUTERS MONEY NETWORK

Who needs a broker when there's Reuters Money Network? This program from Reality Technologies offers all the invest-

Continues on page 40

Inkjet Printers

CONTINUED FROM PAGE 37

In addition to plain and coated papers, the Stylus accepts transparencies and envelopes, but not labels and card stock. Envelopes must be fed individually, and you must go through a series of lever flips and control-panel operations before starting.

The Epson, Lexmark, and TI printers reviewed here use nearly identical Windows drivers developed by Software 2000. Their drivers each use a tabbed-dialog interface to provide easy control of brightness, contrast, and color saturation, as well as common quality modes, dither patterns, and media selection.

CANON BJC-4000

A price-conscious buyer who wants the flexibility of a four-color printer may find the \$549 Canon BJC-4000 Bubble Jet Printer a bargain. The combination of 360-dpi resolution and Canon's Bubble Jet technology yields text quality second only to that of the Stylus. It exhibits no ink spray, but its ink does bleed a little on plain paper.

Unfortunately, the graphics quality doesn't quite match that of other four-color ink jet printers on the market. Color on plain paper isn't as vivid, and transparencies aren't as saturated. It does come with a well-designed, Windows-based manual.

On the flip side, though, the BJC-4000 doesn't sacrifice throughput, making it a good choice for all-around office work. At 115 cps under Windows, 121 cps under DOS, and graphics throughput of 0.7 gppm under Windows, the BJC-4000 is one of the fastest all-around ink jet printers.

The BJC-4000 can print on card stock, and Canon claims it will one day print on cloth, a unique feature at this end of the ink jet market. Its only shortcoming for office work is its awkward envelope handling. You must remove the paper from the feeder to insert envelopes, as

well as flip a couple paper-thickness and levers.

LEXMARK EXECJET IIC

This three-color version of the monochrome-only Lexmark ExecJet II offers a good trade-off between price and features for the home or small-office user who occasionally needs color.

The setup software is especially well designed for the hardware neophyte. Like the HP DeskJet 540, its closest competitor, the ExecJet IIC performs tasks such as automatically printing a test page. But software configuration of the ExecJet IIC is less than straightforward; it uses the same confusing Toolkit utility as the ExecJet II for setting print quality and emulation. The ExecJet IIC has a full control panel on the front of the unit.

Although it uses the Software 2000 driver, Lexmark refers to its driver technology as Color-Fine. Colors are saturated, and the composite black is surprisingly good. The ExecJet IIC's 600- by 300-dpi text-enhancing PQET mode yields good quality, although with a bit of ink spray. At a sluggish 70 cps, text throughput roughly matches that of the HP DeskJet 540. Graphics throughput is a disappointing 0.9 gppm under DOS, almost 50 percent slower than that of the HP DeskJet 540.

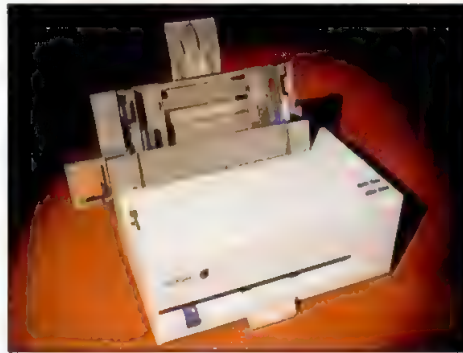
Since you can feed envelopes in a stack or individually without removing your regular paper, the ExecJet IIC will easily fit into your office routine, although it won't accept card stock or B-size paper.

HP DESKJET 540

The \$365 HP DeskJet 540 is targeted at the color ink



QUICK PRINT: The Canon BJC-4000 Bubble Jet prints graphics and text very quickly.



STRIKING A BALANCE: The Lexmark ExecJet IIC balances performance, price, and features.



BARGAIN: At \$365, the HP DeskJet 540 is the cheapest way to get color.



LARGE FORMAT: The TI microMarc Color is the only printer reviewed here that can print on 11- by 17-inch paper.

jet entry point. Unlike its sibling, the HP DeskJet 560C, it sports a Southwestern, adobelike look; the front panel controls consist only of power and on-line switches. Sensibly, HP has moved the power and parallel-port connectors from under the printer to its back, although it still uses a proprietary AC adapter.

Configuration takes place entirely in software; you control functions such as media selection and print quality via a DOS-based TSR or Windows utility.

On its own, the HP DeskJet 540's graphics print quality looks good, but when compared with that of the microMarc Color or ExecJet IIC, the deficiencies are apparent. The colors are bright and saturated, but the HP DeskJet 540's composite black isn't dense enough to make the image appear as sharp. But, HP's ColorSmart Windows driver makes it easy to optimize dithering for different types of graphics. Like that of the ExecJet IIC, text quality is good, with some ink spray. In addition to printing text in 600- by 300-dpi mode, the HP DeskJet 540 utilizes HP's Resolution Enhancement Technology.

Throughput is mixed. Text comes in at 95 cps under Windows and 69 cps under DOS. Graphics throughput is 0.4 gppm under DOS and 1.6 gppm under Windows.

The HP DeskJet 540's paper handling is very good. Like the HP DeskJet 560C, all media feeds in stacks through the front, and there are no levers to flip or buttons to push.

Continues on page 39

First Looks

Inkjet Printers

CONTINUED FROM PAGE 38

TI MICROMARC COLOR

With a price of \$439, good image quality, and relatively poor text output, the TI microMarc Color isn't an obvious choice for any application in particular, especially given its high cost per page. It is, however, the only printer of this group that supports B-size paper, albeit in portrait mode only—a common compromise.

Although the composite black of this three-color printer doesn't get quite as dense as that of the ExecJet IIc, the microMarc Color fares well at graphics printing—although on our DOS tests the printer had a tendency to produce banding on the second of two copies. Text, which is printed at 300 dpi, appears faintly fuzzy, due in part to a slight amount of ink spray combined with bleeding on plain paper.

Text throughput of 96 cps under Windows puts the microMark about even with the HP DeskJet 540, but with 106-cps throughput under DOS, it's close to the top of its category. Graphics results are mixed: Its 0.4-gppm throughput under Windows ties that of the HP DeskJet 540, but it's not quite up to that of the other three-color models. Under DOS, its 3.3-gppm throughput puts it close to the top.

Feeding envelopes and other media manually is very difficult; there's no hard guide to align it, so the media can enter at an angle. We also couldn't get the

COMPARE: Although the color accuracy for printing photographs varies widely among inkjet printers, all five of the printers produce bright, saturated colors, with minimal loss of detail. Clockwise from the lower left: The 720-dpi resolution of the Stylus renders sharp edges, while colors produced by the 300dpi BJC-4000 are not as vivid. The dithering patterns of the Lexmark ExecJet IIc and especially of the HP DeskJet 540 make edges look fuzzy. The TI microMarc Color printer does better at images than characters.



Canon BJC-4000 Bubble Jet Color Printer



Lexmark ExecJet IIc



HP DeskJet 540



Epson Stylus Color



TI microMarc Color

microMarc Color to recognize the manual-feed envelope option in Microsoft Word for Windows 2.0. Technical support was of little help.

You've got more choices than ever before when it comes to selecting a new color ink jet printer. While the models are just different enough to keep

your decision from being determined solely by price, they're similar enough to make selection difficult.

► **Epson Stylus Color.** List price: \$699. Epson America Inc., Torrance, California; 800-289-3776, 310-782-0770; fax, 310-782-4248.

Circle 426 on reader service card

► **Canon BJC-4000 Bubble Jet Color Printer.** List price: \$549. Canon Computer Systems Inc., Costa Mesa, California; 800-848-4123.

Circle 427 on reader service card

► **Lexmark ExecJet IIc.** List price: \$399. Lexmark International Inc., Greenwich, Connecticut; 800-358-5835, 606-438-2468.

Circle 428 on reader service card

► **HP DeskJet 540.** List price: \$365. Hewlett-Packard Co., Santa Clara, California; 800-752-0900; fax, 800-333-1917.

Circle 429 on reader service card

► **TI microMarc Color.** List price: \$439. Texas Instruments Inc., Austin, Texas; 800-848-3927, 512-794-5970; fax, 512-250-7329.

Circle 430 on reader service card

Comparison of Features: Ink Jet Printers

■=YES □=NO

	Canon BJC-4000 Bubble Jet Printer	Epson Stylus Color	HP DeskJet 540	Lexmark ExecJet IIc	TI microMarc Color
List price	\$549	\$699	\$365	\$399	\$439
Cost per monochrome page	4.0¢	2.0¢	3.0¢	3.0¢	9.6¢
Cost per color page	\$0.26	\$0.13	\$0.21	\$0.19	\$1.19
Percentage of color page covered	30 percent	15 percent	25 percent	15 percent	25 percent
Colors printed	CMYK	CMYK	CMY	CMY	CMY
Maximum graphics resolution (dpi)	360 x 360	720 x 720	300 x 300	300 x 300	300 x 300
Maximum text resolution (dpi)	360 x 360	300 x 300	800 x 300	600 x 300	300 x 300
Prints on card stock/B-size paper	■ □	□ □	■ □	□ □	□ ■

Portfolio Managers

CONTINUED FROM PAGE 37

ment-research abilities you'd traditionally seek from a broker. You can get stock and mutual fund quotes, as well as conduct research on stocks, mutual funds, CDs, and bonds; it even offers a news-clipping service to keep you up to date on the companies you follow.

Version 2 of Reuters' Money Network delivers on-line trading via the PC Financial Network (PCFN), one of the largest on-line discount brokerage firms. And after you've made your purchases, the program keeps portfolio data current by updating prices each time you log on to the network.

The financial glossary and help system are good but provide only basic information about investing; they are not how-to-invest guides. Although the program provides the depth of information you need to be confident in your investment decisions, there's little tutorial to get market newcomers up to speed. At \$25, however, Reuters Money Network is a bargain that could show dividends quickly.

WINDOWS ON WALL STREET

MarketArts' Windows on Wall Street is a good introduction to investing that lets new investors take a peek inside the workings of Wall Street. It stops short when it comes time to actually invest, though.

It's no mistake that the program opens up to its help system the first time you launch it. This section not only steps you through the program, it offers two detailed primers that for all intents and purposes might be called "Everything You Ever Wanted to Know About Investing, but Didn't Know What or Whom to Ask."

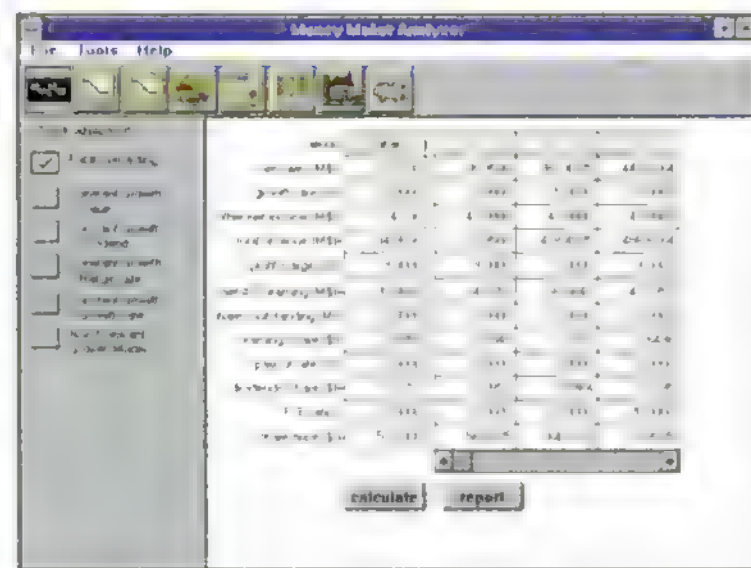
There are two parts to Windows on Wall Street, Version 2.1. The Analysis Primer is an introduction to the fundamentals of stock analysis and includes a clear, concise ten-step

guide to selecting stocks. This guide explains how to pick and investigate stocks. The second primer is actually a well-written glossary, which clearly defines investment terminology. This information alone will put many a new investor at ease.

Once you've studied these



FORECAST: Reuters Money Network includes powerful forecasting tools to predict how your portfolio will do.



PREDICT: Using three different scenarios, Money Maker can predict a range for your investment over time.

guides, you're ready to analyze a multitude of investment opportunities. Here the program shines. Seasoned investors can use Windows on Wall Street to gather the latest market data and look at it in dozens of ways. The package gathers data from any of three on-line services: CompuServe, Dow Jones, and Dial Data. It's your choice—but you'll need an account.

What Windows on Wall Street won't do is let you buy and sell securities via the PC. It's a research tool only, but one useful enough to let you access all the data you'll need to take charge of your broker.

MONEY MAKER FOR WINDOWS

If you don't know from P/E ratios, payout rates, and earnings per share, skip Money Maker for Windows. Q-West Associates has aimed Money Maker directly at the Wall Street maven, not the casual investor.

Paradoxically, although

Money Maker is the most detailed of the three programs reviewed, it is also the simplest to run. It offers two straightforward programs that facilitate investing: Money Maker Analyzer appraises the growth potential of investments, and Money Maker Portfolio records investment data. Both tools are simple, yet each requires a market-savvy investor at the keyboard.

Money Maker Analyzer can forecast the growth and return potential for stocks, bonds, mutual funds, futures, and options. And it offers a mortgage analyzer and savings planner for

keeping track of your entire portfolio. Money Maker Analyzer will forecast stock prices and predict capital growth in a half-dozen ways, calculate potential bond performance, and judge the outlook for options, mutual funds, and futures.

Don't expect a lot of hand-holding, though. Money Maker doesn't offer fancy charts and graphs; its reports are simple tax and capital gains records. But it does make it easy to record investments in stocks, options, mutual funds, bonds, and futures. It also makes it easy to update prices, note sales, and quickly sort investments by value, name, date, or return.

WHICH ONE IS FOR YOU?

Each of these three programs has a place among investors, and your choice will depend entirely on your comfort with the market and your willingness to put a little financial risk into your personal computing. If you're ready to make your own investment decisions and want a program to ease you into the market, Reuters Money Network can be a broker in a box. Active investors who need good research but not the ability to trade on-screen will find Windows on Wall Street a robust research tool that skips the how-tos and what-fors. The last of the triad, Money Maker for Windows, ought to carry a warning label like "This is not a toy. For use only by professional investors." It is, however, quite appropriate for users who know their way around the market and are on the prowl for their next big win.

PC-centric investors looking to make a killing in the market should have no trouble finding the right program to suit their needs and level of Wall Street proficiency.

► **Reuters Money Network.** Estimated price: \$24.95. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later. Reality OnLine Inc., King of Prussia, Pennsylvania; 800-346-2024, 610-277-7600; fax, 610-278-6115.

Circle 431 on reader service card

► **Windows on Wall Street 2.1.** List price: \$149.95. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. MarketArts Inc., Richardson, Texas; 800-998-8439, 214-235-9594; fax, 214-783-6792.

Circle 432 on reader service card

► **Money Maker for Windows.** List price: \$99. Requires: 1MB RAM, 1.5MB hard disk space, Microsoft Windows 3.1 or later. Q-West Associates, San Diego, California; 800-618-6618, 619-484-6648; fax, 619-484-8606.

Circle 433 on reader service card

Corel VENTURA™

POWERHOUSE PUBLISHING!

5

VENTURA POWER *with* **COREL EASE OF USE!**

Corel VENTURA 5 offers the precision and power to take any document from conception to completion. With an intuitive new interface and powerful architecture that supports both structured and freeform documents, Corel VENTURA 5 can produce all your publishing, quickly, easily and accurately. New features include irregular text wrapping, incremental rotation of text and objects, customized presets, OLE 2.0 in-place editing and advanced cross-referencing and indexing capabilities. Combined with the artistic power of Corel PHOTO-PAINT 5, Corel VENTURA 5 is the ideal tool for creating newsletters, catalogs, technical manuals, brochures and more.

Includes
COREL PHOTO-PAINT 5™
The Best in Photo-Editing and Bitmap Creation

COMPUTER *City* **SUPERCENTER**
1-800-826-3928



* Manufacturer's List Price in US\$. Dealer may sell for less.
CIRCLE 322 ON READER SERVICE CARD

COREL
1-613-728-3733 ext.20

KUR-0076

Windows Utilities

UniType Puts the World's Languages in Your PC

BY EDWARD MENDELSON

UniType is an ambitious program that lets you switch among multiple languages, Roman and Non-Roman alphabets, and multiple keyboard layouts while working in any Windows application. Gamma Productions' package (priced from \$99.95 to \$349.95, depending on the languages included) comes with well-drawn fonts for all supported languages, and supports right-to-left languages such as Arabic and Hebrew. It's sometimes awkward to use, but nothing else brings as much of the linguistic world to your desktop.

The basic package supports Western European languages such as French, Spanish, and German, among others; optional versions add Greek, Cyrillic, Indian, Arabic, Korean, and ancient and biblical languages. Optional add-ins provide on-the-fly spell-checking in multiple languages.

Supplied macros seamlessly integrate UniType with Microsoft Word for Windows and WordPerfect for Windows. A keystroke in each word-processor pops up a list of installed languages. You click on the language you want to write in, and UniType remaps the keyboard and text fonts to match. A second macro switches from your current language selection and the one you used previously. Everything else in your word processor works as it normally does, albeit with a foreign charm. UniType normally appears as a narrow window at the foot of your screen, along with an optional keyboard layout chart.

The most impressive feature of UniType is its intelligent typography. In complex languages like Arabic, Hebrew, and

Hindi, the same letter has a different shape if it appears at the end of the word, compared with its shape at the beginning. Some pairs of letters must be combined into a special letter called a ligature, as well. UniType performs both feats transparently.

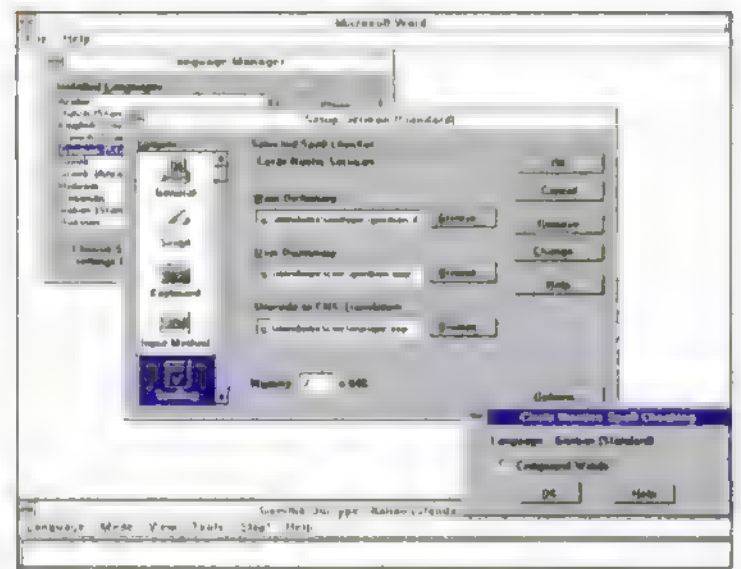
UniType's keyboard layouts use four different shift states, with special characters on the Ctrl-Alt and Ctrl-Shift-Alt layouts. UniType uses "dead keys" for typing accented characters. Type the key with the accent and nothing happens until you type the letter under the accent, and then the accented letter appears in your document.

UniType works smoothly when you type most Western languages, but complex languages or on-the-fly spell-checking gets tricky. You can easily lose track of whether the focus is on UniType's input window or the word-processor. Working

with a word processor other than Word for Windows or WordPerfect can be particularly troublesome, because you have to change fonts in the application by hand.

Even in Word and WordPerfect, when you use UniType's optional dictionaries, you have to switch to a mode that displays every word or paragraph in UniType's input window before feeding it to your word processor. When you finish typing a word or phrase, a dialog box pops up to confirm any unrecognized words—and then you have to move the focus back to the word processor.

UniType's setup is also less than straightforward. When you install a spell-checker, you have to enter two file locations in an options menu, even though the



TRANSLATOR: UniType lets you customize all of its language features, including spell-checking on-the-fly.

two files are in the default directories. Unfortunately, you won't find this information in the program's manual.

Despite its teething problems, UniType is the only system-wide Windows tool for multilingual computing. No other software adds so many linguistic abilities to Windows applications.

► **UniType, Version 1.5.** List price: \$99.95 to \$349.95. Requires: 7MB hard disk space, Microsoft Windows 3.1 or later, 4MB RAM. Gamma Productions Inc., San Diego, CA. 800-974-2662, 619-794-6399; fax, 619-794-7294.

Circle 423 on reader service card.

■ Accent on Multilingual Word Processing

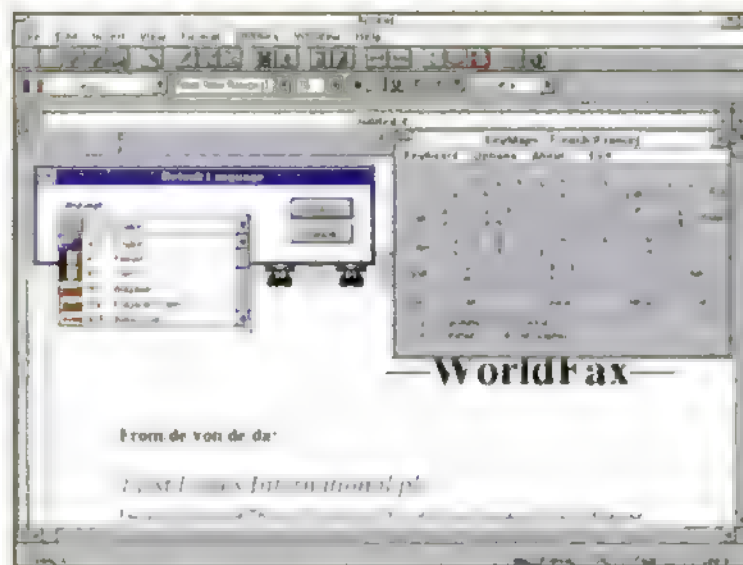
Accent 1.0's claim to fame isn't its feature set—which is suitable only for simple documents—but its ability to load fonts and keyboard layouts for 34 European languages, with spell-checking in 17 and hyphenation in 12. This \$299 word processor can also display its menus in any of 8 languages. The result is as close to a multilingual word processor as exists today.

The toolbar has a drop-down list with the flag and name of the language you're working in. When you choose Russian, for instance, the text switches to a Cyrillic font, and the keyboard changes to the Russian layout. Dialog boxes for Search and

other features include the same drop-down list. In contrast, Word for Windows and WordPerfect for Windows spell-check in multiple languages only if you buy add-in dictionaries and lack automated language switching.

A version with only five common languages is due later this year for \$199, and an all-language version with no spell-checking or other tools for \$49.—EM

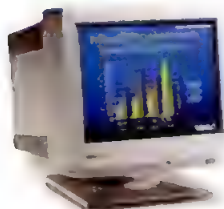
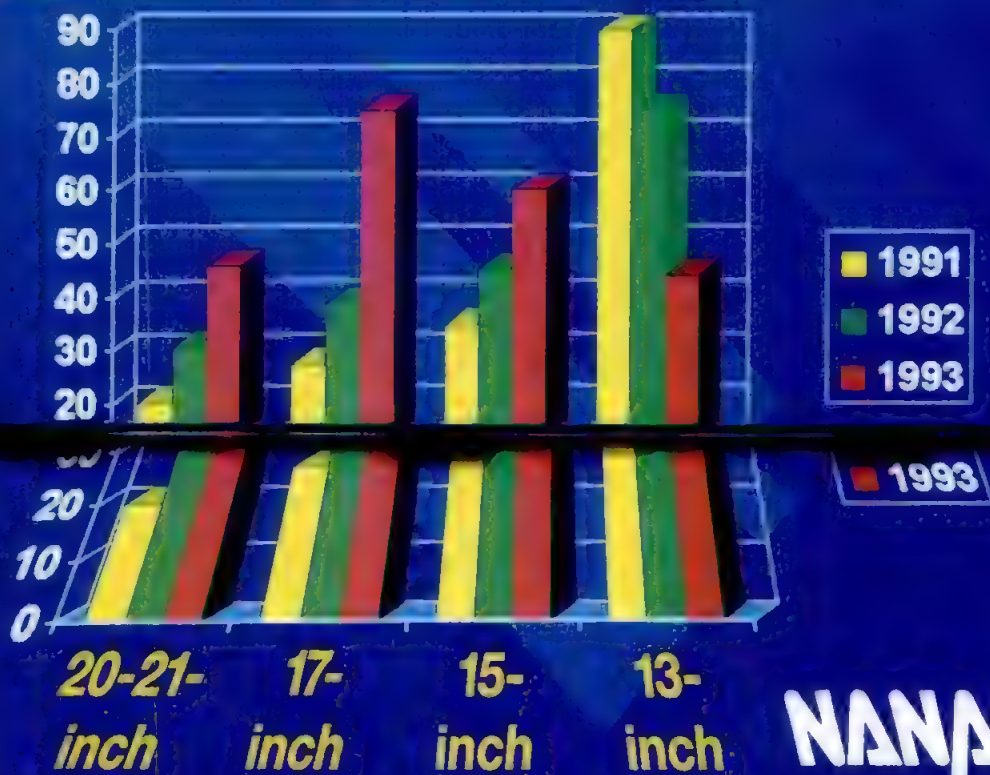
► **Accent, Version 1.0.** List price: \$299. Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1 or later. Accent Software International, Exton PA. 800-535-5256; fax, 800-535-5257. Circle 436 on reader service



KEY MAPS: Accent displays the keyboard for the current language being used.

Now what you see
is what you print.

Monitors in
environment



Nanao has something
you've been waiting for: WYSIWYP.

We're the first monitor manufacturer to include
new Colorific™ color management software free with our
17" or larger FlexScan® professional display monitors. With

easy-to-use, set-and-forget Colorific, you can print graphs, presentations, transparencies
and other business documents – the first time – in the colors you actually see on the
screen. Just think what this means: output color accuracy. Time savings. Reductions



in trial-and-error draft printing. No more surprises. Colorific is the first
software-only color calibration system that replaces add-on hardware
solutions costing from \$300 to \$1,000. And it's available today. Once
again, Nanao continues a tradition of industry innovations. Our award
winning FlexScan family of monitors are renowned for ultra high resolution, sharp
edge-to-edge focus, energy-saving features and high product reliability. Now we're
adding one more breakthrough to the list: WYSIWYP with Colorific.**

NANAO®

Superior In Every Detail

NANAO USA CORPORATION
23535 Telo Avenue, Torrance, CA 90505
(310) 325-5202 Fax: (310) 530-1679
1-800-800-5202

3 Year Warranty*

To qualify for free Colorific, purchase of Nanao 17" and up monitors must be made on or after 8/1/94.*

Superior In Every Detail is a registered trademark of Nanao Corporation. All product names are trademarks of their respective companies. ©1994 Nanao USA Corporation. *1 year on P & L, 1 year on CRT. **Actual printout may vary. Colorific provides nearest possible match of output.

CIRCLE 283 ON READER SERVICE CARD

Video

Matrox Impression Plus: 3-D Glasses for Your PC

BY JAMES KARNEY

Matrox Graphics Systems is once again raising the bar in the graphics accelerator game by offering a redesign of their MGA graphics engine, along with improved drivers and more features, at a lower price. The 64-bit MGA Impression Plus video accelerator boards are priced from \$449 to \$599 and offer resolutions as high as 1,600-by-1,200 with 65,000 colors, and 1,280-by-1,024 with 24-bit true color. But the real story is that these PCI-based cards go a step further than ordinary accelerator boards with built-in 3-D support.

The Impression Plus's 3-D graphics capabilities include gouraud shading, Z-buffering, and double-buffering. In the past, these features appealed only to CAD users, but with Windows image programs such as CorelDRAW, Visual Reality, and Caligari providing 3-D drawing tools, Impression Plus should be a hit with desktop illustrators. The CD-ROM that's provided with the board includes a 3-D developer's toolkit that will help you get started with 3-D work. Impression Plus provides application support for Microsoft's Open GL, AutoDesk HOOPS, and VESA VAGI 3-D libraries. Also included are a game sample pack and NT, OS/2, and Dyna-View CAD drivers.

VIDEO ADD-ONS

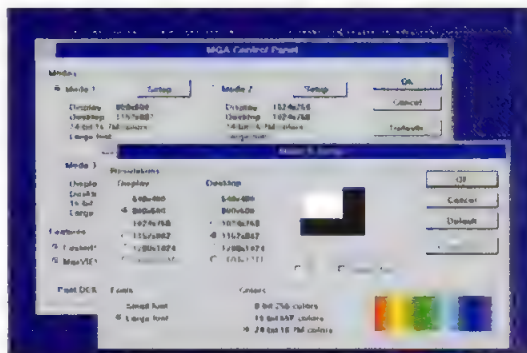
The Impression Plus is available in both 2MB and 4MB VRAM versions that offer 24-bit color

resolutions up to 800-by-600 and 1,600-by-1,200, respectively. In addition, Matrox offers a choice of either a 170-MHz or a 220-MHz digital-to-analog converter (DAC). The faster DAC

area, and a MaxView feature fills the area with the currently selected window.

Installing the Impression Plus in a Micronics 90-MHz Pentium system was easy and hassle-free.

We snapped the card into a free slot, booted Windows in VGA mode, and then ran the setup utility. The drivers were loaded, a new program group with the video card's controls was created, and we were offered the ability to select the default operating resolution and mode.



AUTO-SETUP: Setup with popular monitors is quick and easy.

allows the Impression Plus to operate at an 80-Hz refresh rate at 1,600-by-1,200 resolution.

Memory can be added via a daughtercard, so all 2MB cards can be upgraded to high resolution and full-color depth. Matrox is planning to release other add-ons later this year, including a video playback card, a video encoder—allowing output to video tape—and a video capture board.

Like the Impression and the Ultima Plus, older members of the MGA family that won Editors' Choice awards (see "Bit Blasters," June 28, 1994), Impression Plus offers on-the-fly mode-switching of both resolution and pixel depth without exiting Windows. The card has a virtual desktop feature with hardware pan and zoom capabilities. A pan lock limits scrolling of the virtual desktop and automatically centers dialog boxes in the visible

THE TEST RESULTS

Tuning the card for your monitor can improve performance. We paired the Impression Plus with a NEC 5FGp display and were able to access all resolutions, including 1,600-



THE IMPRESSION PLUS: Combines high-end Windows performance with 3-D capabilities.

by-1,200 resolution at 16-bit color. Novices can choose a defined monitor type, and power users can tweak virtually any setting. Fine-tuning is handled with an interactive test screen that allows you to resize and position the image, and to interactively

tweak the refresh rate.

The Impression Plus's performance on PC Magazine Labs' Graphic Winmark test was in line with other 64-bit video engines: 37.8 millions of pixels per second operating at 1,024-by-768 resolution with 4MB of VRAM in 8-bit mode, and 27.5 millions of pixels per second for the same resolution in 24-bit mode.

One of the few complaints we have had about the Matrox's MGA series is its dismal DOS video score. The Impression Plus does nothing to address this complaint; its score of 494 on our DOS video test lags behind other video cards in its class. On the other hand, most people will buy this card for Windows use. Game players will appreciate the combination of Matrox's video chip and its drivers. We used the Impression Plus with DOOM! and doubled the resolution from 320-by-240 to 640-by-480 without any increase in flicker.

Throughout our testing, mode-switching was clean, with only a momentary jump in the image. Unfortunately, there was a strange line in the opening Windows logo, but we encountered no problems during actual Windows operation.

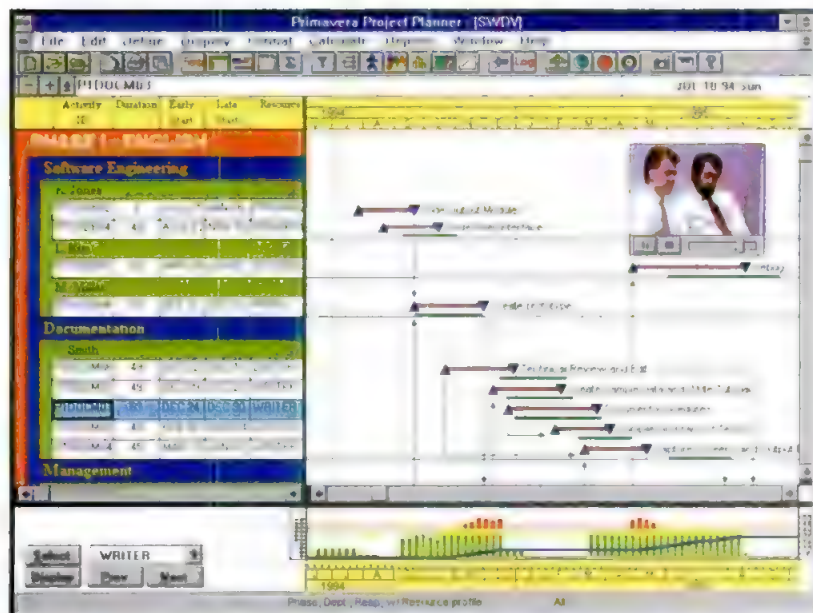
Matrox plans to follow up the PCI-based Impression Plus with VL-Bus and ISA versions. If you're looking to get the most out of Windows, the Impression Plus is as good as it gets. Almost all 64-bit engines offer comparable 2-D performance, but for now, only Matrox offers 3-D with all the extras.

► MGA Impression Plus. List price: \$449 (170-MHz DAC), \$549 (220-MHz DAC). Requires: PCI slot. Matrox Graphics Systems Inc., Dorval, Quebec, Canada; 800-361-1408, 514-685-2630; fax, 514-685-2853.

Circle 421 on reader service card.

Primavera Project Planner.[®]

Project management software that's so powerful,



Primavera Project Planner gives you unlimited ways to organize and format project information for better on-screen analysis and reporting. No other software uses Windows better for the project manager. Primavera takes full advantage of Windows functionality including drag and drop, Object Linking and Embedding, and more.



FREE!
Primavera action video.
Call 1-800-423-0245!

Windows is a trademark of Microsoft Corporation

Introducing the power to see everything more clearly. To understand what's happening. And to control every detail of the project. Primavera Project Planner for Windows[™] is powerful new software, capable of handling the toughest projects, especially in a **SO** multiuser, multiple project environment.

so persuasive,

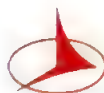
Now you can communicate clearly, dramatically and professionally with information-rich reports and graphics. Primavera makes it easy to get your point across whether you're talking in **SO** the board room, the lab, the plant or on the job site.

so insightful,

Primavera gives you unlimited ways to analyze your project. You can even organize and summarize by resources and WBS. You'll know the who, what, when, why and how much—and keep your project under control.

you'll wonder how you lived without it.

Primavera for Windows will give you what project managers want most. Results. For more information, call 1-800-423-0245.



PRIMAVERA

How the world says project management

Two Bala Plaza • Bala Cynwyd, PA 19004 • USA
(610) 667-8600 • FAX: (610) 667-7894

CIRCLE 148 ON READER SERVICE CARD

See us at Fall Comdex, Booth #L289.

Cellular Communications

Simon: More than a Phone, Less than a PC

BY BRIAN NADEL

With the union of computers and communications upon us, the key question becomes whether the resulting amalgamation produces phones with a built-in PCs or computers with handsets. Bell South takes the phone-centric approach with its \$899 Simon, a cellular phone that has a DOS-based processor, a touch screen, and a variety of built-in applications.

Simon's central focus is its 4.5- by 1.5-inch touch-sensitive LCD panel, which you navigate with an included stylus. Since there is no place to conveniently store the stylus, however, it is likely to be lost. A pen or pencil is a good substitute, but you're left constantly cleaning lead



FAX TO GO: Simon lets you dial up a friend or send and receive faxes or e-mail.

from the display.

The two main screens control the phone and 11 applications: calendar, to-do list, notepad, file system, diagnostics, address book, clock, sketch pad, calcula-

tor, send and receive fax program, and puzzle. The combination of applications works as a reasonably good personal information manager, but as yet there is no direct data link between Simon and a PC.

There are two ways to move data in and out of Simon: You can use a flash memory card in Simon's Type II PCMCIA slot or send and receive information via cc:Mail with the built-in cellular modem. E-mail can be sent and received only at 2,400 bps, which makes for long transfers. You can lock out large messages—a welcome relief for those who seem to be always downloading or paying cellular bills. Faxes are sent and received at a more speedy 9,600 bps.

Designed and manufactured by IBM, Simon is an impressive feat of integration. But at 18 ounces—twice the weight of a typical cellular phone—and 8.5 by 2.5 by 1.5 inches, Simon can be a handful. The nickel-cadmium battery lasts for about 12

hours in standby mode, but you can easily find yourself out of power after 2 hours of phone or computer use.

Though an ambitious effort, unfortunately Simon's 16-MHz, 286-class CPU is not up to the task. It takes several seconds to change screens, and tapping on icons doesn't always work on the first try. The PCMCIA interface wouldn't work with an AMD flash card (Bell South recommends using its flash cards).

Simon's voice and data cellular link give it a big advantage over the wire-bound world of most personal digital assistants—such as Apple's Newton—but that may not be enough. While Simon is definitely much more than a phone, it's still not quite a PC.

► **Simon.** List price: \$899. Configuration: Vadem 16MHz 16-bit CPU, 0.6 watt cellular phone. Bell South Cellular Corp., Atlanta; 800-746-6672, 404-249-5000.

Circle 422 on reader service card

Sound

Audiotrix Pro Puts an Orchestra in Your PC

BY M. DAVID STONE

In terms of both software and hardware, the \$295 Audiotrix Pro from Mediatrix Peripherals places a heavy emphasis on MIDI (Musical Instrument Digital Interface) performance. This emphasis produced positive results and excellent sound quality.

The ISA board uses the Yamaha OPL4 chip set, complete with a 2MB wavetable ROM that stores recordings of 128 musical instruments and 47 percussion sounds as the starting point for producing synthesized music. More importantly, the board allows up to 24 stereo wavetable voices simultaneously, and up to 18 stereo instrument voices generated by FM synthesis.

All this adds up to impres-

sively realistic sound. The difference is noticeable even on the inexpensive Hi-TEX CP-55 speakers that Mediatrix includes with the board. For even higher-quality sound, Mediatrix sells two daughterboards: a \$60 Effects Processor and an \$85 board for custom wavetable storage (neither of which are reviewed here).

To entice you to explore the board's MIDI capabilities, Audiotrix Pro comes with TUNE 1000's Soft Karaoke and two music composition programs, as well as a cable for attaching an external MIDI device. Other software included with the sound board are a Windows driver and the usual assortment of DOS and Windows utilities for

recording and playing wave files and for playing MIDI files.

You'll also find an OLE-aware recorder. For saving disk space, the recorder provides four compression choices, as well as 8-bit mono recording with sampling rates as low as 5.51 kHz. When sound quality is more important than disk space, the recorder offers 16-bit stereo, with sampling rates as high as 48 kHz.

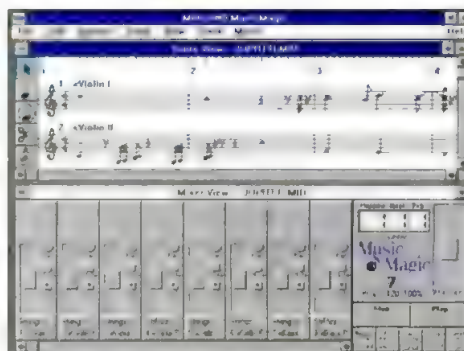
The Audiotrix Pro boasts MPU-401 compatibility as well as compatibility with Microsoft

Windows Sound System, Sound Blaster, and Ad Lib sound cards, which means it should work with virtually any DOS program that incorporates audio. In addition to the MIDI connector, the board includes connectors for a monoaural microphone, stereo input, and stereo output; daughterboards for SCSI or other CD-ROM drives are also available.

Clearly, the Audiotrix Pro will be of particular interest to those who take MIDI seriously. But even if MIDI isn't your primary interest, the Audiotrix Pro will still give you more realistic-sounding synthesized music for games or presentations.

► **Audiotrix Pro.** List price: \$295. Requires: 640K RAM, 16-bit ISA slot, 2MB hard disk space. DOS 3.1 or later. Mediatrix Peripherals Inc., Sherbrooke, Quebec, Canada. 800-820-8749, 819-829-8749; fax, 819-829-5100.

Circle 418 on reader service card



COMPOSE: Music Magic software allows you to compose music using standard notation.

Network Management

Network Central Builds Workgroup Muscle

BY DAVID DEJEAN

First Floor's \$99.95 Network Central won't turn network users into muscle-bound data crunchers, but this network-management program does provide an easy way for individual users and workgroups to get positive data-management benefits without imposing any heavy lifting on the network or its administrator.

This very intelligent package starts by giving each user a clear

the structure of the network.

Tags are stored in Network Central's database, which is called a File Center. There, most of the functions of a document-management system are available to the user.

Not only can you group the results of searches into folders, you can also open files for editing by clicking on their tags, create new files, and delete old ones. Network Central also allows users to track information about the files and changes in their status; assign attributes, such as priorities and deadlines; and add long file descriptions and notes.

If this were all Network Central did, it would be a worthwhile utility for anybody who works in Windows and has to juggle a variety of files in different locations. But

PRIVATE, SHARED, OR PUBLIC

Network Central doesn't replace the network's security system but does coexist with it. Folders and tags in a File Center can be private, shared, or public. Shared items are accessible only to the members of a group set up by the creator of the File Center. This may sound nonsensical, because it restricts access to files tagged within the File Center that may be freely available outside it on the open network.

But Network Central's support for groups dictates that not all tags will have attached files. Some will exist only as mediums to carry on discussions across the network within the workgroup. A collapsible-outline format makes it easy to follow even long, multi-message discussions in a notes field.

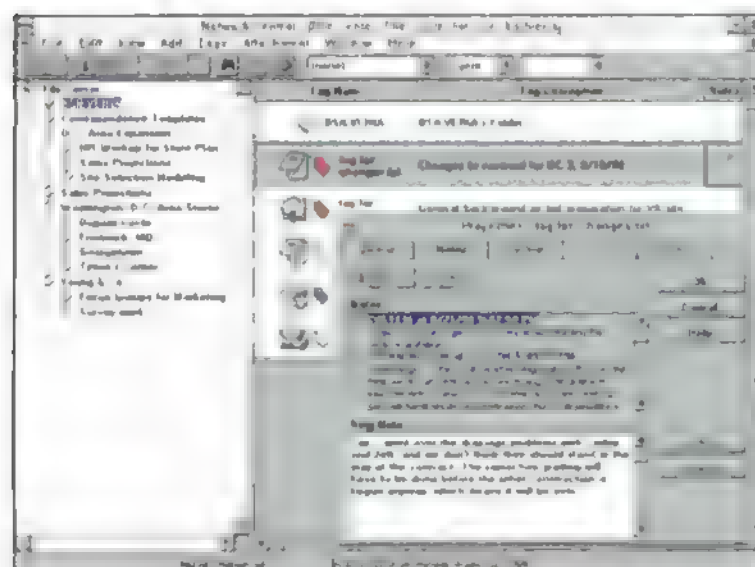
As powerful as Network Central is, there are some obvious shortcomings that are likely

the result of the program's newness. The success of Network Central depends heavily on the discipline of the group. For the change monitoring to work, new files have to be created in monitored directories. If the priority-setting feature is going to mean anything, all group members have to set priorities in the same way. Above all, Network Central isn't a replacement for a

thorough understanding of the directory and file structure of the network but an augmentation of it.

FROM ONE TO ALL

With Network Central, a File Center can be developed and effectively managed by any user in the group, as long as the user has a solid conceptual understanding of the server-and-directory structure of the network. The user gets a lot of help here from the program's documentation, which is excep-



FILE CENTER: From here users can get a network-eye view of all the available files.

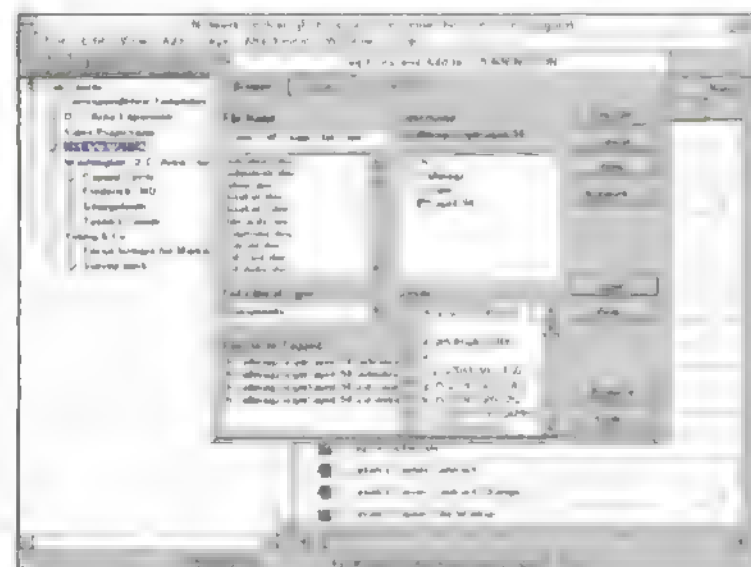
view of what's available on the network. From this information, the program builds a shared vision of the resources a group needs to use in order to do its work.

MINIMAL OVERHEAD

At its heart, Network Central is a workstation program that presents a view of the network that is similar to Windows' File Manager, but with a much wider scope and greater abilities. Unlike File Manager, Network Central can search the contents of files as well as filenames, and lets the user save a record of the files it finds in the form of tags. And it does this without making any changes in the files themselves or altering

Network Central wins the right to be called groupware because of the way it handles files in an office's group dynamic.

The key to effective file management for many people working together is to know when files have changed and to track any alterations. When a user opens a File Center that has been altered since the user last saw the file, change bars appear on any folder or tag where any attribute of the folder or tag—the description, notes, ownership, deadline, priority, or the actual file itself—has changed.



TRACKING: Files that have been altered in any way are immediately tagged.

tionally clear, well structured, and internally cross-referenced.

Network Central is a desktop document manager, not an enterprise-wide communications solution. For some situations, Network Central will be too much; in others it will be perceived as too little. But for many situations where a group's interaction rests on sharing, tracking, and updating files and documents, Network Central could be just right.

► **Network Central.** List price: \$99.95 (two user license pack). Requires: 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later and Windows-compatible network (supported networks include NetWare 3.x, 4.x, and Personal NetWare), Windows for Workgroups and Windows NT, PC-NFS 5.0 or later. First Floor Inc., Mountain View, CA; 800-639-6387, 415-968-1101; fax, 415-968-1193.

Circle 420 on reader service card



From October 10 to 14, you can go on-line to discuss Network Central with First Floor co-founder and CEO David J. Cardinal and reviewer David DeJean. Type GO EXEC at any CompuServe prompt.

■ Communications

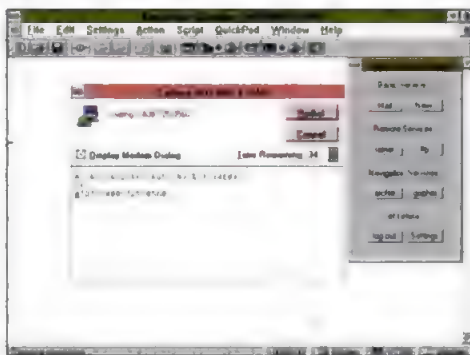
Crosstalk Sharpens Its Internet, LAN, and Fax Skills

BY J.W. OLSEN

There are a wide variety of telecommunication products that target diverse needs, because individual preferences and requirements abound. The \$195 Crosstalk with Crossfax for Windows, Version 2.2, from Digital Communications Associates ups the ante of high-end integrated communications packages. Since Crosstalk for Windows earned an Editors' Choice last year, the program has been enhanced in three notable areas: networking, Internet access, and fax capabilities.

The Crosstalk setup program now offers network and workstation options. The product can be installed and run from a net-

work with public and private subdirectory options. TCP/IP support is provided for Winsock-compatible stacks and other stacks.



INTERNET EASE: Crosstalk helps you break into the wild waters of the Internet.

With the emergence of the Internet, first-time or occasional users will appreciate the new Crosstalk Internet QuickPads and scripts, which support access

providers such as Netcom and Portal. QuickPads are not as handy as dedicated Internet front ends, but for limited Internet use—or to craft specialty scripts—Crosstalk fills the bill.

Crosstalk supports many of the most recent V.34 modems (which support connections of 28,800 bits per second) and finally provides queue dialing to multiple systems. A clever File Save

As option creates a Program Manager icon to load Crosstalk and run a defined task such as exchanging CompuServe e-mail; when running as an icon during file transfer, progress is displayed. Crosstalk's CASL scripting support now embraces external DLLs to access custom functions in external languages.

Like its competitors, Crossfax lets you fax from Windows applications. You can also directly drag and drop files into Crossfax. Fax scheduling from Windows or DOS is reliable; and if transmission errors occur, only the

unsent pages are repeated. Optical character recognition software is included.

We have one concern about Crossfax, however. Background scheduling software disconcertingly accesses the hard disk about every 4 seconds whenever Crossfax Manager is running. This seemingly excessive wear-and-tear delays disk access by other applications. DCA said they will seek to fix this problem by the time you read this.

The Crosstalk module, by contrast, provided solid, reliable functionality. It is a delight to use—especially when calling the same remote systems periodically. With added capabilities, Crosstalk with Crossfax for Windows remains the standard against which competitors must be judged.

► **Crosstalk with Crossfax for Windows, Version 2.2.** List price: \$195. Requires: 400K RAM, 8MB hard disk space, Microsoft Windows 3.1 or later. Digital Communications Associates, Alpharetta, GA; 800-348-3221, 404-442-4000; fax, 404-442-4368.

Circle 416 on reader service card

■ Communications

Telix: Your BBS Surfboard

BY J.W. OLSEN

Whether you're a longtime veteran of electronic bulletin boards or are interested in BBS surfing for the first time, the \$99 Telix for Windows 1.0 package from deltaComm Development is a powerful companion to have along. Telix has its roots in the untamed DOS BBS universe, and like its rival, Procomm Plus for Windows, Telix has entered the world of Windows. Unlike Procomm Plus, however, Telix kept its emphasis on accessing bulletin boards.

The heart of Telix is its phone book, from which you initiate day-to-day functioning of the communications program. Here you add, delete, modify, and organize profiles for up to 1,000 entries for those numbers

you call often, or manually dial one-shot calls. You can enter four access numbers for a remote system and change protocols with minimal mouse clicks or keystrokes.

The ten available terminal emulations aren't plentiful, but they should be adequate for most users because of the inclusion of RIPscript—a graphical, mouse-navigable protocol that is emerging as an exciting, de facto standard to tame the wild world of bulletin boards.

Essential to BBS-oriented products, Telix offers strong scripting support and a "learn" mode that generates basic scripts for you. Two script languages can be written

in the full-featured editor. C programmers will enjoy the syntax and power of SALT (Script Application Language for Telix); others will appreciate English-based SIMPLE (SALT IMPLementation).

An added bonus is that when calling deltaComm's own BBS for product support, the bulletin board automatically offers version-specific patch file updates. Typically cost-conscious BBS

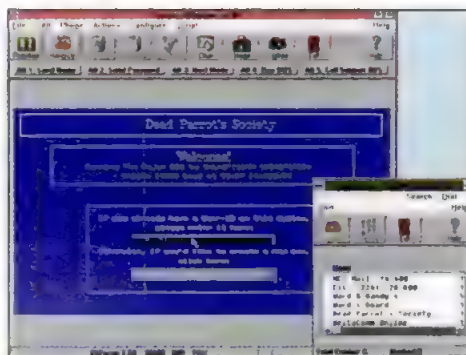
users will value Telix's toll-call costing features, while those who download GIF images will like the addition of a viewer that builds the image as it is transferred.

Telix remains true to its DOS BBS heritage. If you frequent bulletin boards looking for that specific file or piece of information, or if you just like nosing around in search of something interesting, you will

find Telix for Windows 1.0 exceptionally helpful—especially for the price.

► **Telix for Windows, Version 1.0.** List price: \$99. Requires: 2MB RAM (6MB recommended), 5MB hard disk space, Microsoft Windows 3.1 or later. deltaComm Development, Cary, NC; 800-859-8000, 919-460-4556; fax, 919-460-4531.

Circle 417 on reader service card



RIDING THE BBS WAVE: Telix supports the mouse and icon capabilities of RIPscript.

Go Ahead, Get Carried Away

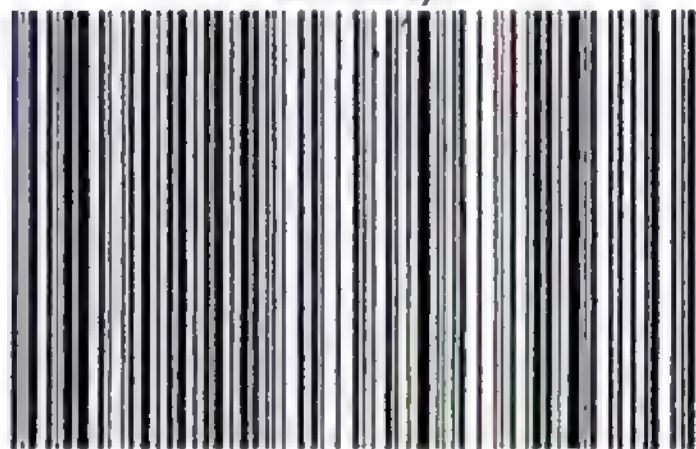




1. Follow instructions on the other side

Back

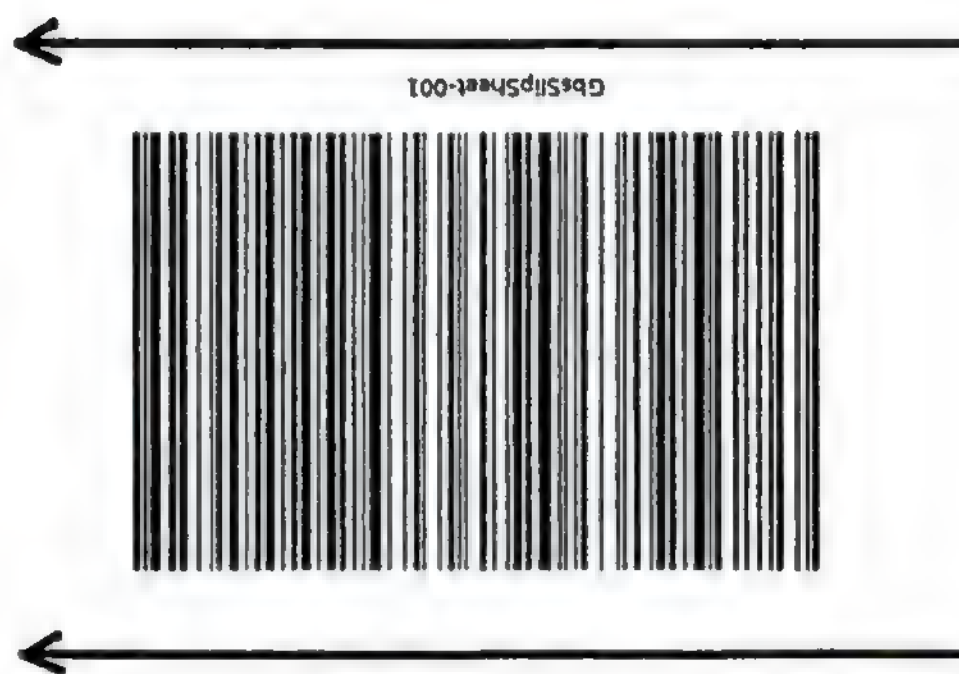
0100-0018



Inverted Back

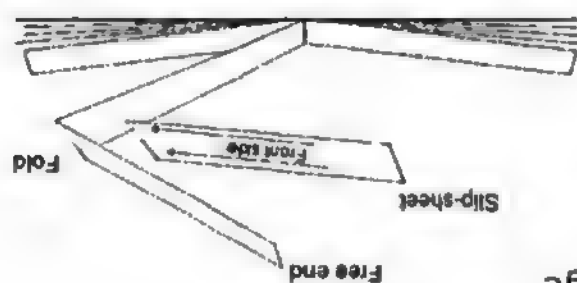
1. Follow instructions on the other side

Folded edge of the page



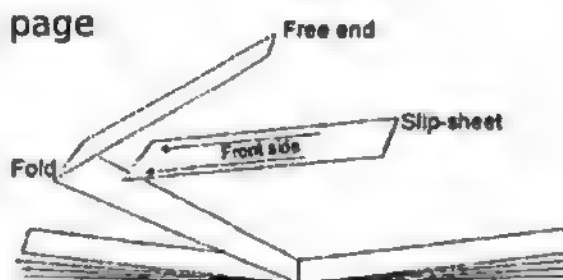
Inverted Foldout slip-sheet

Foldout slip-sheet



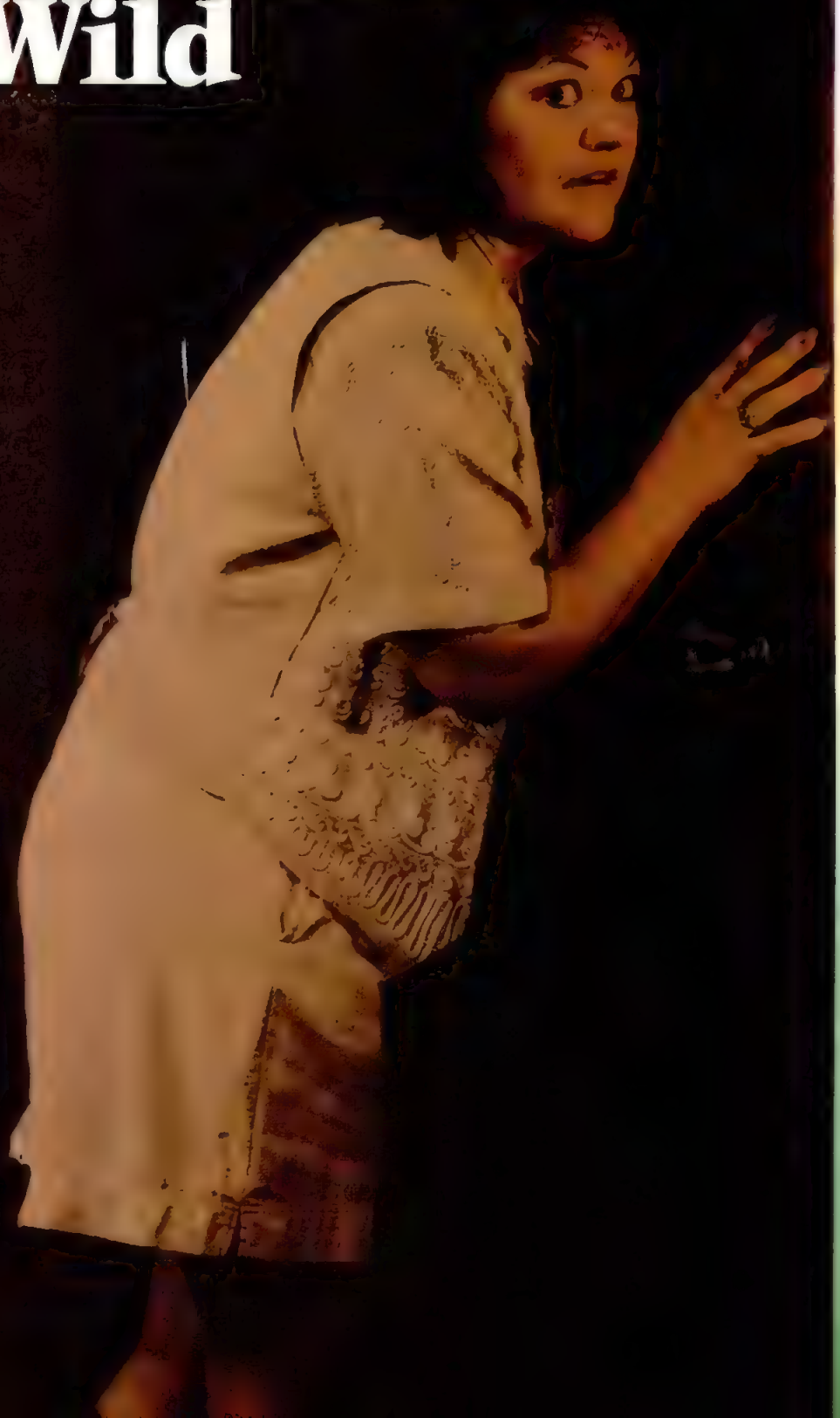
1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

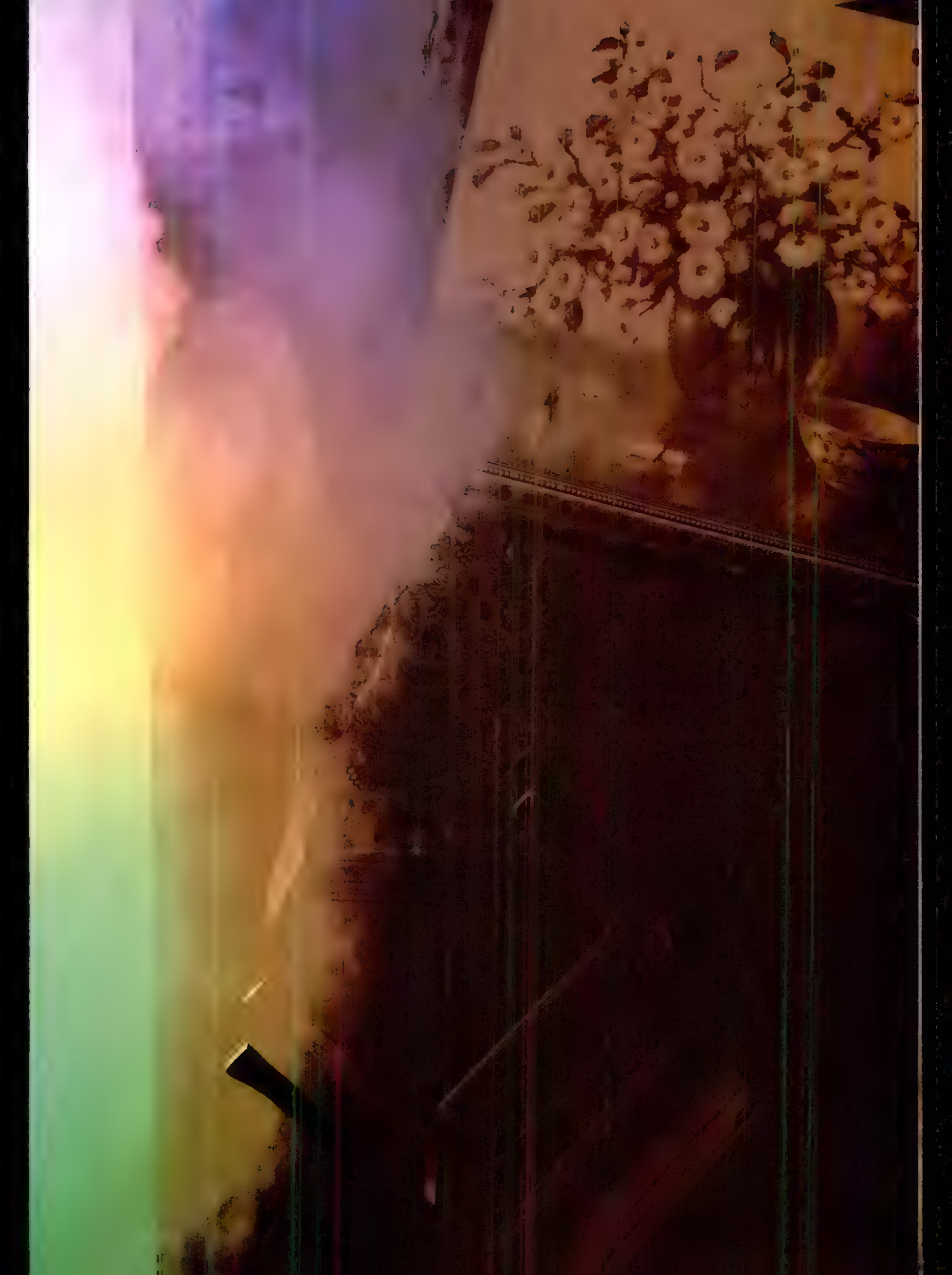
1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet





Let Your Imagination Go Wild





Experience the World of Gateway 2000!

Go ahead. Let yourself get carried away. Because when you buy a computer from Gateway 2000®, you can lose yourself in a whirlwind of extraordinary computer systems and fantastic software. You'll feel like there's absolutely nothing on earth you can't do! So let your imagination run wild. Soon you'll be opening the doors to Gateway 2000 where prices are a breeze and computer dreams really do come true!

Most Gateway desktop systems now include larger hard drives, including a 1GB hard drive on our P5-90XL Pentium™-based machine. So there's no way you can get caught short of space. A TelePath™ fax/modem is included on our new Pentium-based multimedia systems. And CD-ROM drives are standard on all desktop systems. Just imagine what you can accomplish with Microsoft's Office Professional, including the latest versions of MS Word, Excel, PowerPoint® and Access®, now standard on all 486 PCI and Pentium-based systems.

A standard three-year limited parts warranty on all desktop systems and Gateway monitors tops off our tradition of bringing you the best service and support in the industry.

Sound too good to be true? Well, that's not all. The Gateway HandBook® 486 portable PC is now priced at legendary low prices.

Gateway 2000 has grown to become a Fortune 500 company, but we're still the down-to-earth Midwesterners who have always given you a good old-fashioned value. Go ahead, take a visionary's leap into the Gateway 2000 experience. Soon you'll be saying, "There's no place like Gateway, there's no place like Gateway."

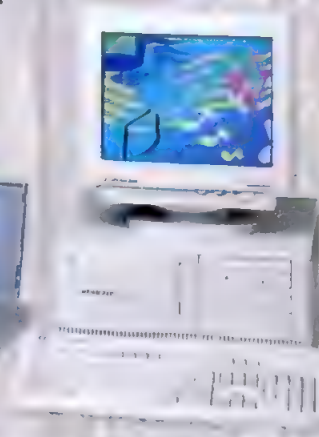
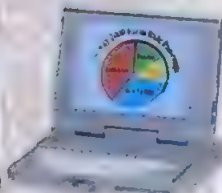
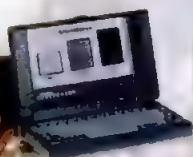
Gateway BBS

CompuServe

Prodigy

Superhighway

Internet



GATEWAY2000

"You've got a friend in the business.™"

8 0 0 - 8 4 6 - 2 0 6 3

All the incredible talent in this ad is provided by Gateway 2000 employees and family members.



Everything Under The Sun!

Supernatural power. Mesmerizing features. Stunning software. It's the Gateway 2000® experience. A place where you can have the fastest CPUs in the land — and so so much more — when you buy a Gateway 2000 Pentium™-based system. And while others are huckstering their stripped-down Pentium-based computers, Gateway presents systems packed with all the stuff dreams are made of!

There's virtually no end to the features included: hard drives up to 1GB, CD-ROM drives, outstanding sound and video performance, the best software, fax/modems on two new multimedia models, and a standard three-year limited parts warranty.

Your dream machine no longer eludes you. Gateway 2000 is making those dreams come true!

Yielding All The Extras

We always want to keep our customers ahead of the industry. So along with Intel®'s super-charged Pentium processor, Gateway helps you extend the life of your system by including

incredible 540MB, 730MB or 1GB hard drives on all Pentium-based systems. Get used to the feeling of being spoiled, because you also get CD-ROM drives, superior video performance *and* plenty of RAM on *all* desktop systems!

Based on the Pentium processor, all our P5 models include a PCI local bus and an enhanced PCI/IDE controller allowing your hard drive to transfer data up to twice as fast as non-enhanced systems.

And now our high-quality desktop systems and Gateway monitors are backed by a three-year limited parts warranty. Believe it — this is one of the best warranties you'll find anywhere!

Multimedia Mania

For those who insist on only the very best, your Shangri-La is our new P5-60 and P5-90 Best Buy multimedia systems. Watch out, 'cuz they're jam-packed with all the premium multimedia features you can imagine! Including a TelePath fax/modem and communications software so you can speak to the world from



your own living room. And tunes never sounded so good with a 16-bit sound card and Yamaha's stereo-quality speakers. Play your audio CDs, hear audio clips or record audio all in perfect harmony.

Wondering what "multimedia" *really* means for you? It's a whole new universe of knowledge, entertainment, communication *and* educational capabilities. Talk about being entranced! You'll experience interactive, full-motion video and stereo audio. And Gateway gives you the key to this universe in a super-fast, feature-packed machine.

Get the best of all possible worlds with these new P5-60 and P5-90 Best Buy multimedia machines!

Software Nirvana

It's a sweet deal. All Gateway Pentium-based systems now come with Microsoft Office Professional, an incredible combination of Microsoft's most popular business applications, including MS Word, Excel, PowerPoint® presentation graphics program, and Access® database, all on a single CD with on-line manuals. These programs in Office Professional are so

tightly integrated, they work together as if they were a single program.

Call for more great software options including our value-packed Multimedia Starter Pack for only \$99.

P5-90XL Paradise

Is it fantasy or for real? Well, it's the Gateway P5-90XL. This ultimate high-flying Pentium-based PC has a larger-than-life 1GB hard drive. You're gonna get all the power and speed you need for today *and* tomorrow! And you get an ATI GX video card using the Mach 64 graphics accelerator, one of the fastest 64-bit accelerators on the market. It's awe-inspiring to see this display on the 17-inch CrystalScan® monitor. Sound, you ask? Ensoniq's Soundscape wavetable sound card makes a staggering difference in audio quality. And you'll get a great balance of crisp highs and plenty of heart-pounding bass — in full stereo sound — from the Altec Lansing ACS-3i speakers, with subwoofer.

For the system of *your* dreams, we'll configure a system specifically to fit your needs. Get everything under the sun with a powerful value-packed Pentium-based system from Gateway 2000!



8 0 0 - 8 4 6 - 2 0 6 3



Know No Boundaries



GATEWAY2000
COLORBOOK

You'll be transported to outer bounds when you discover the ColorBook™ from Gateway 2000®. Experience the rapture of color portability *and* performance with a 340MB hard drive on the 75MHz model. A rainbow of 256 brilliant colors in VGA mode bursts from an incredible 10.4-inch dual-scan screen on three ColorBook models. You won't find another portable screen this big, this affordable, anywhere else.

And while everyone else is hiking up their color portable prices, Gateway still offers you an incredible value on our feature-packed ColorBooks, from the \$1,999 SX model right up to the DX4-75. And our DX2-50 model recently won *PC World's* Best Buy award in the Power Mobile PC category.

All Gateway ColorBooks are based on the Intel® SL Enhanced 486 processor with enough power and memory to run all your Windows applications. Weighing less than 5.7 pounds, measuring 1.77-inches thin, all models include two PCMCIA Type II or one Type III slots, excellent battery life, carrying case and a great suspend/resume feature. Our DX2 and DX4 models also include PCMCIA fax/modems. And Microsoft Works™ or MS Office Professional is standard on all ColorBook models.

No, it's not an illusion ... it's the ColorBook from Gateway 2000.



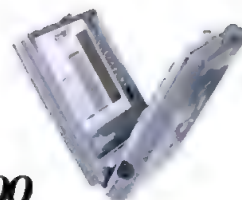
GATEWAY2000
HANDBOOK 486

Visualize the ideal portable experience. On the road to enlightenment you'd like to have a lightweight, compact, real 486 PC all at an uncommonly low prices. The Gateway 2000 HandBook® 486 is so extraordinary, it's portable computing utopia! With unbelievable prices on all HandBook models (they start at just \$999!) there's never been a better time to indulge yourself in a world of 486 power that you can take anywhere.

The HandBook's slight frame — weighing less than three pounds and measuring roughly 10 x 6 inches — makes it an enchanting little PC. The HandBook DX2-50 gives you more MIPS per pound than any other portable PC. With Microsoft Office Professional included, the DX2-50 is an unbeatable value. And at these prices you can get the HandBook as a companion to your desktop system.

The HandBook's features are astounding. It has a bright, backlit VGA screen and a comfortable, touch-type keyboard along with an external diskette drive and leather carrying case. With two batteries included, the HandBook also lets you "hot swap" — change batteries or peripheral while the PC is running without rebooting the system or losing data.

All Gateway ColorBook and HandBook portable PCs come with a standard one-year limited parts warranty. A special VIP warranty is available only at the time of purchase for an additional \$100.



You Can Have It All!

The Gateway 2000 Family PC

There's no place like home when you have a Gateway 2000® Family PC™ in the house. Every member of your family will be swept away as they discover inspiration, entertainment and learning experiences.

This fully equipped multimedia system takes you to a whole new dimension. You get a fast CD-ROM drive to run the best programs and games with sound, pictures, animation and video. With its high-quality sound card and speakers, the Family PC lets you play music CDs, hear audio clips or record audio — all with magical stereo sound.

The Family PC's fax/modem has all the communication software you need to access information and other computer users from all over the world through on-line services.

Experience a virtual software playground with Microsoft Works™ Multimedia Edition, MS Encarta 1994 Multimedia Encyclopedia, MS Money™, new MS Complete Baseball, and MS Multimedia Golf.

You won't find another home PC more loaded than Gateway Family PCs and our Pentium-based multimedia systems — in any land.

3-Year Warranty

Gateway desktop systems come with one of the strongest warranties in the industry. All Gateway 2000 desktop PCs are backed by a three-year limited warranty on parts. The new three-year limited parts warranty includes Gateway monitors.

Gateway customers also receive a 30-day money-back guarantee and toll-free technical support. And *PC Magazine* readers recently honored us, for the fourth consecutive time, with their highest rating in *PC Mag's* Service and Reliability survey.

On-site service is available during the first year in most U.S. locations and may be provided without charge if our technicians determine it necessary.

For details on our new warranty and all of our service and support policies, please call or write for a free written copy.

Payment Options

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® Card, issued by Dial National Bank, Des Moines, Iowa.

To Other Worlds

Gateway 2000 customers in Canada and Puerto Rico receive toll-free telephone service in both countries (see the back page of this ad for special 800 numbers) along with award-winning technical support and CSA approvals. On-site service is available in some Canadian and Puerto Rican locations, and our international shipping rates are among the most competitive in the industry.



8 0 0 - 8 4 6 - 2 0 6 3



A Gateway 2000 Family PC is your doorway to new worlds



Printed on recycled paper with soy ink.

Gateway 2000 is a corporate sponsor of
GLOBAL RECYCLE

Multimedia Systems

4SX-33 FAMILY PC™

- Intel® 33MHz 486SX CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM, 16-Bit Sound Card & Speakers
- ♥ 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS® 6.22 & WFW 3.11
- ♥ MS Works™, Encarta, Baseball, Money™, & Golf
- ♥ 3-Year Limited Parts Warranty

\$1499

4DX2-66 FAMILY PC

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 128KB Cache
- 420MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM, 16-Bit Sound Card & Yamaha Speakers
- ♥ 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Works, Encarta, Baseball, Money, & Golf
- ♥ 3-Year Limited Parts Warranty

\$1999

P5-60 BEST BUY

- Intel 60MHz Pentium™ CPU*
- 8MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Sound Card & Yamaha Speakers
- ♥ TelePath™ II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan® Monitor
- Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2499

P5-90 BEST BUY

- Intel 90MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Sound Card & Yamaha Speakers
- ♥ TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2999

Professional Systems

4SX-33

- Intel 33MHz 486SX CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Works 3.0 CD
- ♥ 3-Year Limited Parts Warranty

4SX-33 \$1299

4DX2-66 \$1599

(w/ 540MB Hard Drive)

P4D-66

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2199

P5-60

- Intel 60MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2299

P5-90 XL

- Intel 90MHz Pentium CPU*
- 16MB RAM, 256KB Cache
- ♥ 1 GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- ♥ ATI Mach 64 with 2MB VRAM
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Wavetable Sound Card & Altec ACS-31 Speakers
- 3.5" Diskette Drive
- 17" Color CrystalScan 1776LE
- Tower Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$3999

Portables

HANDBOOK® 486

- 2.94 Lbs., 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 or DX2 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 80MB to 250MB IDE Hard Drive
- External 3.5" Diskette Drive
- 7.9" Backlit VGA Display
- 2 NiMH Batteries & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- EZ Point™ Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2® Ports
- Leather Carrying Case
- MS Works for Windows 3.0 or MS Office Professional
- MS-DOS 6.22, WFW 3.11 & Serial Transfer Cable

HANDBOOK 486SX-25

4MB RAM, 80MB Hard Drive, Works

♥ **\$999**

HANDBOOK DX2-40

8MB RAM, 130MB Hard Drive, Works

\$1499

HANDBOOK DX2-50

8MB RAM, 250MB Hard Drive, MS Office Professional

\$2499

COLORBOOK™

- 5.7 Lbs., 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486, DX2 or DX4 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 3.5" Diskette Drive and Removable 250MB or 340MB IDE Drive
- 10.4" or 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots (1 Type III)
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial, PS/2 & VGA Ports
- MS Works or Office Professional
- MS-DOS 6.22 & WFW 3.11

COLORBOOK 486SX-33

4MB RAM, 250MB HD, Case, Works

♥ **\$1999**

COLORBOOK DX2-40

4MB RAM, 250MB HD, Fax/Modem, Case, Works

\$2699

COLORBOOK DX2-50

8MB RAM, 250MB HD, Fax/Modem, Case, Office Professional

\$3199

COLORBOOK DX4-75

8MB RAM, 340MB HD, TelePath Fax/Modem, Case, Office Professional

\$3699



Toll free from Canada
800-846-3609



Toll free from Puerto Rico
800-846-3613



8 0 0 - 8 4 6 - 2 0 6 3

*Intel Verified:
Upgradable



Extraordinary Extras!

A wonderland of value: Gateway 2000's peripherals and software, sold only with the purchase of a system.

MULTIMEDIA

Basic Audio Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC.

- Gateway 2000 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
- 2 Labtec® CS-180 speakers
\$109 (with system purchase)

Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq Soundscape 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster, AdLib, Roland MPU 401, MS Windows Sound Sytem and MT 32
- New Altec Lansing ACS-31 three-piece speaker system
- MidiSoft Sound Explorer and Time Warner's Aegis software
\$249 (with system purchase)

Altec Lansing ACS-31 Speakers

A Gateway exclusive from Altec Lansing: a three-piece speaker set at a two-piece price. Two 3-inch free-standing speakers crank out up to five watts per channel while the subwoofer can deliver 15 watts of heart-pounding bass. **\$99**

Multimedia Software Starter Pack

You get nearly \$700 worth of software for less than \$100! Package includes Cinemania '94, Mad Dog McCree, Tuneland, Mayo Clinic Family Health Book, Better Homes and Gardens Cookbook, The Lawnmower Man, Sitting on the Farm, Mavis Beacon Teaches Typing, Chess Master 3000, U.S. Atlas and World Atlas. You also get a compact disc cleaner and 20-disk storage rack. **\$99**

MONITORS

CrystalScan® 17-Inch Monitor

Non-interlaced color monitor with intelligent multi-scanning analog color display capable of 1280 x 1024 resolution in non-interlaced mode, .26 dot pitch.

Upgrade from a 14-inch CrystalScan 1024NI monitor **\$395**

Upgrade from a 15-inch CrystalScan 1572 monitor **\$335**

(Upgrade prices good only at the time of system purchase.)

COMMUNICATIONS & STORAGE

TelePath™ II Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Includes data and fax communication software, CoSession™ Host remote diagnostics, plus a CompuServe® trial membership. **\$99**

Colorado Memory Systems® TBU

250MB internal tape backup unit copies up to 9.5MB per minute. Comes with MS Windows™ and DOS software, one tape and cable. **\$149**

PRINTERS

Hewlett®-Packard 4L LaserJet Printer

A full-featured 300dpi printer loaded with enhanced PCL 5 and 26 scalable typefaces with 1MB standard HP Memory Enhancement Technology. Includes parallel cable. **\$699**

Hewlett-Packard 4P LaserJet Printer

A 600dpi printer for four times the dots of 300dpi laser printing with enhanced PCL 5 and 45 scalable typefaces. 2MB standard memory and 3 universal SIMM slots available for additional memory or PostScript fonts. Includes parallel cable. **\$999**

Epson® Stylus™ 800 Ink Jet Printer

Get the look of a laser at a dot matrix price with the Stylus 800. Prints 150 characters per second at 360dpi — fast and quiet! Includes parallel cable. **\$289**

Call for other printer options, including more *Hewlett-Packard* printers.

NETWORKING

Ethernet Adapter from 3Com®

Ultra high-performance 16-bit Ethernet cards from the world leaders in Ethernet technology.

16-bit Triple Media Card supports BNC, AUI and Twisted Pair media **\$119**

16-bit Twisted Pair only **\$99**

Token Ring

IBM® 16-bit Token Ring card **\$429**

PORTABLES

Peripherals and upgrades available only with a Gateway portable purchase.

PCMCIA Cards

- TelePath 14,400 Fax/Modem. **\$249**
- Token Ring adapter. **\$449**
- (Also in X-Jack version, same price)
- HandBook VGA adapter. **\$229**

- 9,600/2,400 Fax/Modem. **\$149**

- Ethernet adapter. **\$149**

Other Accessories

- 2.2Ah NiMH batteries. Call for prices
- Extended VIP warranty — we ship a replacement to you within 24 hours during warranty. Point of sale only. **\$100**
- HandBook 3.5" external floppy. **\$99**
- ColorBook carrying case. **\$49**
- HandBook leather carrying case. **\$55**

Call the Gateway 2000 special component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers.



8 0 0 - 8 4 6 - 2 0 6 3

■ Graphics

Visio 3.0 Draws on Graphic Experience

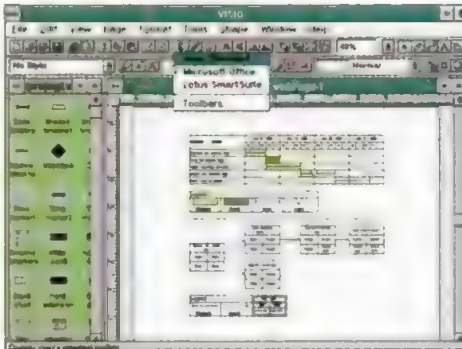
BY BARRY SIMON

Shapeware created the concept of drag-and-drop drawing with its Visio charting program, and Version 3.0 boasts an improved interface, better speed, and more efficient file formats. All told, the \$199 package keeps the program competitive without sacrificing its legendary ease of use.

The basic method of producing drawings is still unchanged: you drag shapes from templates and then augment them with additional lines and curves. Visio 3.0

includes over 750 symbols that are organized into 22 categories.

The smart connectors between shapes have been improved to insure that the closest connection point is used for attaching two shapes together. In addition, the toolbar now con-



CUSTOMIZE: You can choose among three interface personalities: Microsoft Office, Lotus Smart Suite, or standard Visio.

tains a Connector Tool that works in two ways. If you drag a new shape into your chart, that shape is connected to the nearest element. Alternatively, this feature can be used to add a connector between two existing shapes.

To make room for the extra buttons, an element's details—for example, line type and fill color—have been moved from drop-down items to pop-ups on the status bar. For users of Microsoft Office or Lotus Smart Suite, Visio 3.0 offers toolbars with a

similar design. The program will also add a Visio launch button to the toolbar in Word for Windows or Ami Pro; Visio acts as an OLE 2.0 server replacing the menus and toolbar in the word processor while you work on the drawing.

Another convenience is that if you double-click on a shape to edit the text inside it, the text is



From October 17 to 21, you can go on-line to download a demo of Visio or to discuss the product with reviewer Barry Simon and Visio product manager Morgan Brown. Type GO EXEC at any CompuServe! prompt.

automatically magnified. Any object can be set up so that a double-click passes you to a secondary drawing page, which works well for producing multilayer organizational charts. Visio now contains a print preview function.

This version of Visio introduces a more efficient file format. Our informal tests show that Visio 3.0 files are smaller by about three-fold compared with the same illustration in Visio 2.0 format.

Overall, this upgrade adds to the attractiveness of Visio and is one that current business users will want.

► **Visio, Version 3.0.** List price: \$199; upgrade, \$69. Requires: 4MB RAM, 14MB hard disk space, Microsoft Windows 3.1 or later. Shapeware Corp., Seattle, WA; 800-446-3335, 206-521-4500; fax, 206-521-4501.

Circle 425 on reader service card.

■ Windows Utilities

SuperPrint Performs 32-bit Printing Now

BY CAROLE PATTON

If you thought you'd have to wait until the release of Chicago to get the benefits of 32-bit printing, it's time to think again. The \$99 SuperPrint, Version 3.1, from Zenographics replaces your 16-bit Windows GDI with a 32-bit version that increases print speed and produces higher-quality output.

The performance boost SuperPrint gives you can be dramatic. It took 14 minutes 38 seconds to print a full-page color image on a Canon BJC-600 ink jet printer using Windows, and only 6 minutes 8 seconds to print the same image with SuperPrint. SuperPrint is compatible with more than 50 popular printers.

The included SuperQueue spooler starts jobs prior to print-

processing, quickly returning control of the computer to you. By contrast, Windows' Print Manager ties up your computer until the print job is nearly finished. SuperQueue allows background printing, batch printing, or remote printing on a network server.



ENHANCE: SuperPrint 3.1 sharpens edges and makes an image more realistic. The photograph on the left was printed with SuperPrint 3.1, the one at right through Windows.

For gray-scale images, Zenographics has added threshold arrays to SuperPrint's algorithm-based halftone patterns. These are dot patterns stored in a .BMP file. Each dot pattern can be superimposed on your gray-scale digital image to alter its appearance. The choices range from traditional, ordered dot patterns to a scattered, or stochastic, screen that produces a creative image. The halftoning dialog box has a drop-down list box that shows the available pat-



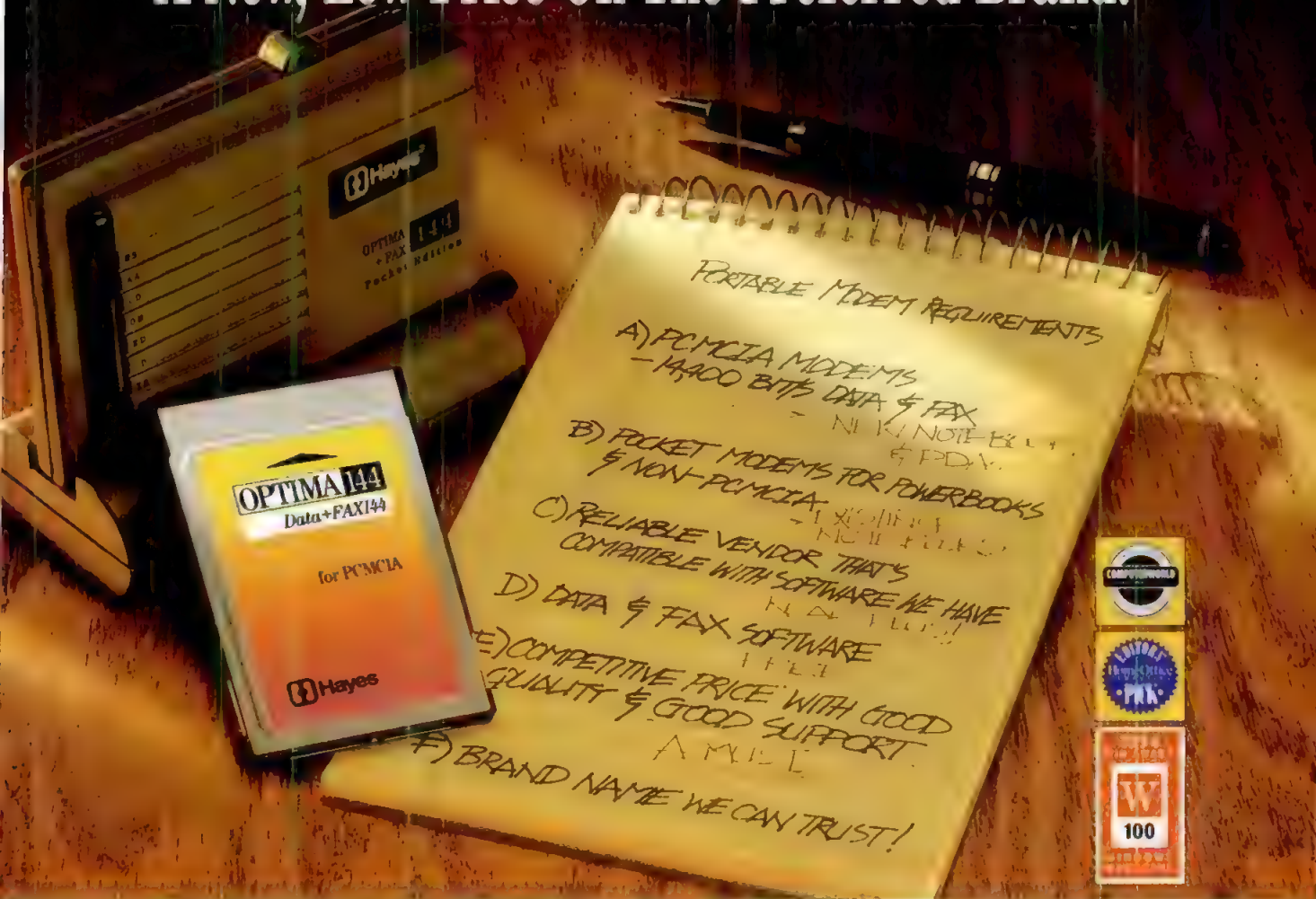
terns and displays a representation of the pattern you are considering. SuperPrint uses color-correcting technology to produce sharper, more realistic images from a variety of ink jet printers.

There was little to gripe about in SuperPrint 3.1. One minor failing: It doesn't support Ami Pro's envelope feature, but a patch is available on CompuServe (Type "GO WINAPB"). As for SuperPrint's future, its SuperQueue spooler won't work with Chicago—so when the next-generation operating system arises, you'll definitely need to upgrade. Chicago will probably offer 32-bit printing performance, but why wait? SuperPrint will do this job for you today.

► **SuperPrint, Version 3.1.** List price: \$99.95; upgrade, \$29.95. Requires: 4MB RAM, 1.5MB hard disk space, Microsoft Windows 3.1 or later. Zenographics Inc., Irvine, CA, 714-851-6352; fax, 714-851-1314.

Circle 424 on reader service card

Top Off Your Mobile Communications List With A New, Low Price On The Preferred Brand.



**NEW
PRICE**

\$299

\$399
OPTIMA 144+
FAX144 Pocket
Edition

In a recent CRN/Gallup Survey, Hayes was a 3 to 1 winner in brand preference

among Fortune 1000 companies. The same quality and reliability that's made us the preferred brand is available for the road as well.

Hayes® OPTIMA™ 144 Data + FAX144 for PCMCIA provides dependable performance for notebooks or PDAs with PCMCIA Type II slots and above. For remote applications as well as convenient desktop use with PCs and Macs™, there's the stylish Hayes OPTIMA 144 + FAX144 Pocket Edition®.

And all OPTIMAs have Hayes AutoSync for synchronous transmissions without an adapter card.

To start communicating fast and easy, all of our modems come with free Smartcom™ data and FAX software. And every Hayes modem is backed by a veteran customer service and support team.

For more information on our mobile computing solutions for almost any need, call **800-96-HAYES**, or call our FAX back service **Hayes FAX Response** at **800-HAYES-FX** and request Document 950. In Canada, call **800-665-1259**.



Source: CRN February 24 & 25, 1988 / Time Outing / Application

Hayes®
Increasing the Speed
of Business.™

CIRCLE 136 ON READER SERVICE CARD

Go Online With Hayes BBS; in U.S. call 800-874-2937 or 404-446-6336, in Canada call 800-429-3722.

©1984 Hayes Microcomputer Products, Inc., P.O. Box 105283, Atlanta, GA 30348. Hayes, the Hayes logo, the Hayes logo and Pocket Edition are registered trademarks, and the Hayes '302 Escape Sequence Patent icon, Increasing the Speed of Business, OPTIMA, and Smartcom are trademarks of Hayes Microcomputer Products, Inc. Other trademarks are those of their respective companies. Prices are suggested retail and are in U.S. dollars.



Video

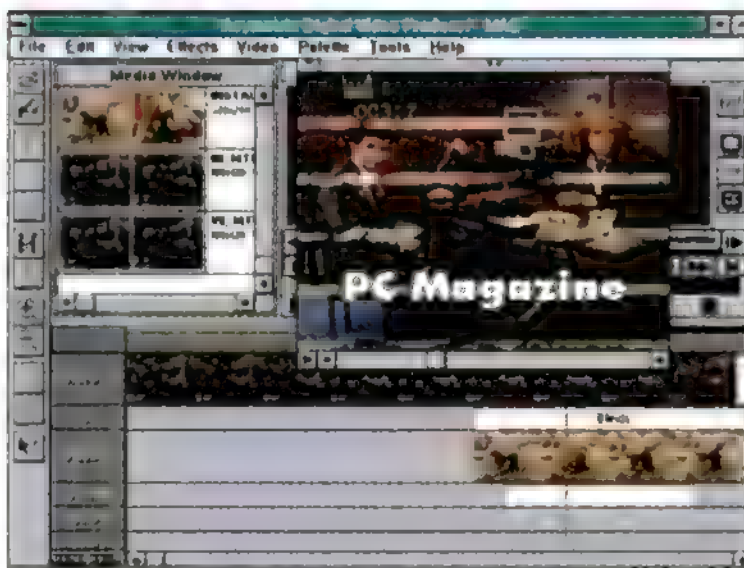
Intel's Smart Video Recorder Gets a Lot Smarter

BY JAN OZER

Our experience has been that the terms *high-quality* and *easy-to-use* typically don't appear in the same sentence as *digital video*. Intel's \$570 Smart Video Recorder Pro threatens to change that by offering outstanding video-capture performance in a comprehensive package for beginners and professionals alike.

The Smart Video Recorder (SVR), introduced in late 1993, won an Editors' Choice award in "Reel to Real" (April 26, 1994). In the meantime, Intel cut design and manufacturing costs by converting the clunky motherboard-daughter-

card combination into a single half-length card featuring a 64-bit 25/50-MHz i750 RISC engine. In addition, the SVR has



EDIT: Intel's Smart Video Recorder Pro plus Asymetrix's Digital Video Producer equals a video-editing suite for the PC.

an upgraded Indeo compression algorithm and the latest Philips analog-to-digital front end. Like

the old board, the SVR features composite and S-Video connectors and accepts both NTSC and PAL video input.

The SVR was able to capture 30 frames per second (fps) of video at a resolution of 320-by-240 in Indeo 3.2 compressed format on a PCI-based AST Premia 90-MHz Pentium system. However, on a Gateway 486DX2/66 VL-Bus PC, the SVR dropped frames at 30-fps capture, but managed 15 fps without a problem. Since 15 fps is the most common software-only compression frame rate, the SVR's capture performance was adequate for most applications. Overall, the video quality was excellent, with realistic color contrast and fine detail, a clear improvement over the output of the older product. This reflects the quality of

the new Philips 7196 encoder chip and the increased compression performance.

An added bonus is the inclusion of Asymetrix's Digital Video Producer (DVP) software, which provides both video capture and video editing functions. As a video editor, DVP excels at making common video-editing tasks accessible. Even a beginner should quickly be able to learn to create transitions between clips and compress to final output.

With the SVR, Intel improved both video quality and capture performance and assembled a software-hardware combination that's at once full-featured and accessible. The result is a high-quality, inexpensive, and easy-to-use digital video production suite that is just as suitable for beginners as for professionals.

► **Intel Smart Video Recorder Pro.** List price \$570. Requires: 4MB RAM, minimum 486 SX/25 CPU, VGA display, Microsoft Windows 3.1 or later. Intel Corp., Hillsboro, OR; 800-538-3373, 503-629-7576.

Circle 434 on reader service card.

Legal Software

LegalPoint: PC Paralegal

BY AMY H. FISHER

With legal fees often running at \$200 an hour, simple cost-cutting methods can potentially make a big difference. One alternative is to buy boilerplate documents at a stationery store and fill in the blanks, but the results are often less than polished. Teneration's \$99.95 LegalPoint combines 70 editable documents with useful advice.

LegalPoint's main screen is the entrance point. Click on Create New Document and you can choose from documents and contracts that range from an employee noncompete agreement to a promissory note. Variable information, called Decision Points, is highlighted in red; click here for assistance and advice. Some of this information, such as your company's name and state of incorporation,

can be automatically entered. Additional general information is available by clicking on the document's green titles. Finally, a general overview of Business Law Topics is available on-line.

Simple documents such as a purchase order or a confidentiality agreement are the program's strength, but more complicated transactions such as a partnership agreement can be daunting for legal amateurs. For example, the Business Law Topic selection on Bankruptcy runs seven screens. Prior to completing any document, you need to read carefully all pertinent material. Even with a built-in checklist to make sure you've filled in all the blanks, a nonlawyer may have difficulty in determining whether all bases

have been covered.

And even when the contract is complete, there are problems: The Equipment Lease contains a typographical error that reverses the Lessor (the person renting the equipment) and Lessee (the person doing the renting), causing the Lessee to indemnify the Lessor for things the Lessor did. This is the opposite of what is needed. And at times the cross-referencing is not complete. In the Bankruptcy section, the Guaranty contract

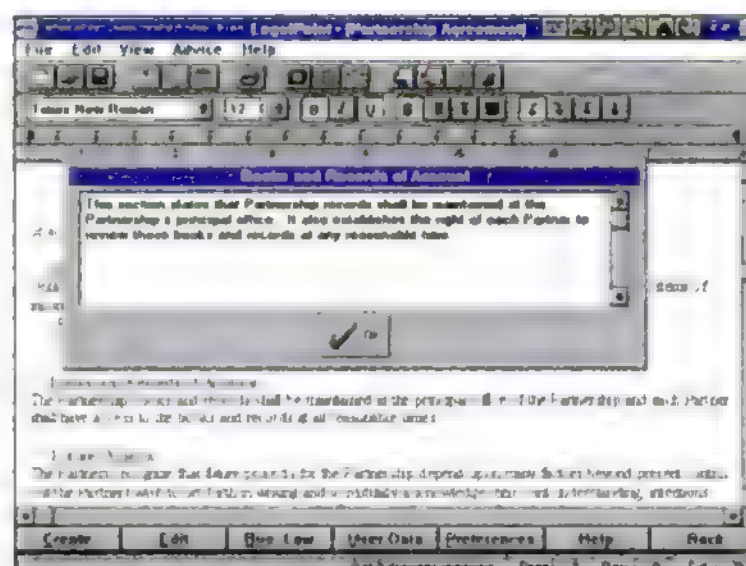
advises that an insolvent debtor can assume or reject an executory contract (a lease, for example). But this is not mentioned in the Lease or its advice.

Even with a DX4-powered PC, LegalPoint is painfully slow, taking up to 10 seconds to open a new document. You can set the toolbar to mimic either Ami Pro or Word for Windows, but you can only export documents in text-rich format.

Although LegalPoint is no substitute for a well-informed, conscientious lawyer, the program can help draft the correct document. Once you get this far, take your product to a lawyer for the finishing touches.

► **LegalPoint for Windows.** List price: \$99.95. Requires: 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. Teneration Corp., Overland Park, KS; 800-529-5669, 913-451-3663.

Circle 435 on reader service card.



LEGAL EAGLE: LegalPoint provides advice and the starting point for 70 legal documents.

THERE ARE A
NUMBER OF
AFFORDABLE PRINTERS

THAT PRODUCE
LASER-QUALITY IMAGES
IN BLACK AND WHITE.

This SHOULD
BREAK THE PATTERN.



With the new Canon BJC-4000, you can now get superior-quality black and white performance, as well as color, without having to break the bank. Its standout performance includes laser-sharp 720 x 360 dpi in monochrome. A five page per minute print speed. And vibrant 360 dpi in color. For more information or your nearest Canon dealer call 1-800-848-4123.

Canon

Accounting

CheckMark Makes Paying Employees Easier

BY GREGG KEIZER

To the many small businesses drowning in a sea of payroll-related paperwork, the \$129 CheckMark Payroll for Windows might seem like a well-timed life preserver. CheckMark is a standalone payroll system that automates many of the tedious calculations and record-keeping functions associated with paying people.

With export connections to three of the most popular small business accounting packages, CheckMark is a useful add-on for the entrepreneur. But since the functions of CheckMark are being integrated into many new accounting packages, this is a stopgap product for those who don't want to abandon their present accounting system.

START TO FINISH

CheckMark takes care of virtually every payroll-preparation task, from entering the hours each employee worked to figuring payroll deductions to printing checks and generating quarterly withholding tax reports. The program lets you customize and build from scratch such payroll elements as income and pay types.

CheckMark is only getting started when the paychecks are printed. The package includes tax tables for all 50 states and a handful of localities, so calculating state and even local tax deductions is a snap. CheckMark prints directly to W-2 and federal 941 forms, and tracks vacation and sick time as it accrues and is used. More than 20 reports detail daily withholding liabilities, total earnings for each employee, and employee personal and tax information. You can revise the tax tables with a \$69 annual update, or modify them yourself.

Most of the headaches that result from the use of CheckMark occur during setup. This is not a fault of the program, but something inherent in the complexity of establishing a flexible payroll record-keeping system. Most of the setup time is required to enter employee information and build the foundation for later automation. To make the process as painless as possible, CheckMark has preset income, deduction, and pay types; there are screens where you often just click to fill in boxes or type to fill in fields; there are also scrolling lists for selecting such things as pay frequency. The bottom line is that you'll still spend considerable time with these mundane tasks.

Once everything is in place, CheckMark earns its keep. It can easily account for such extras as bonuses—both fixed amounts and those based on commission.

To handle payroll, all you do is enter the hours worked within a worksheet, select a pay period, click on a calculation button, and then print the checks singly or in a batch. It took just minutes to process payroll for five employees, the typical company size for this product. Checks printed within CheckMark show pay period and year-to-date totals for all deductions on the stub, as well as accrued hours such as sick, vacation, and compensatory time. Errors can be corrected by voiding checks and starting over or by deleting a paycheck entirely. You can also print employer expense checks—those

for paying withholding, Social Security, and unemployment insurance, for instance—from within the package.

CheckMark's reporting skills are excellent. Various employee reports provide all-in-one-glance looks at one or more workers, highlighting everything from

forms 941 and W-2—can CheckMark actually print on the paper forms.

ACCOUNTING CONNECTION

As a standalone system, CheckMark works well, assuming much of the burden of generating a business' regular payroll. But payroll doesn't operate in a vacuum, and neither does CheckMark.

CheckMark can export posted checks to M.Y.O.B. for Windows 4.0, Peachtree Accounting for Windows 2.0, or Quicken for Windows 3.0 for analysis and record-keeping, but the results are less than satisfying.

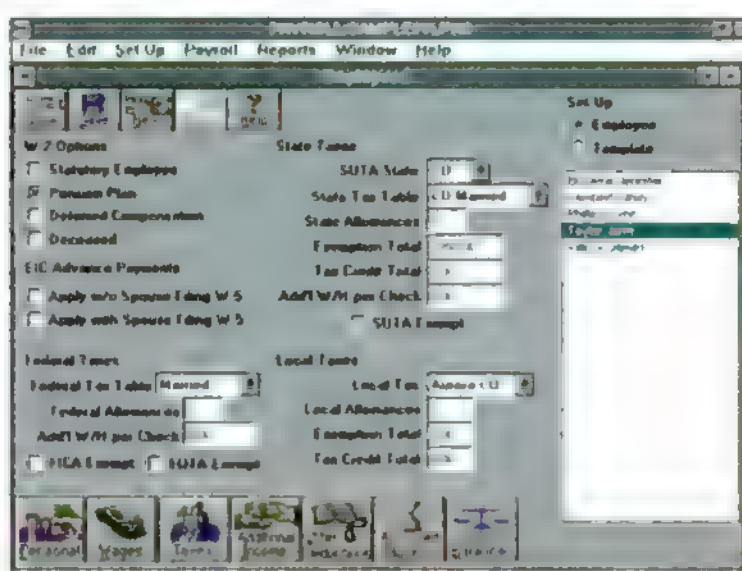
Checks can be printed within Quicken, for example, and the deductions automatically categorized, but the stubs contain neither year-to-date totals nor accrued vacation or sick-time hours. Nor can you produce payroll-specific reports within Quicken (unless you opt for the \$75 QuickPay add-on program, a payroll module specific to Quicken and Intuit's QuickBooks). It makes even less sense to spend time moving CheckMark data to Peachtree or M.Y.O.B., both of which include payroll modules.

CheckMark may be a flexible and productive, but in an era when top-notch small business accounting programs include payroll capabilities, the worth of this package to the small business operator is increasingly questionable. For those who do not want to upgrade their accounting software, CheckMark is a

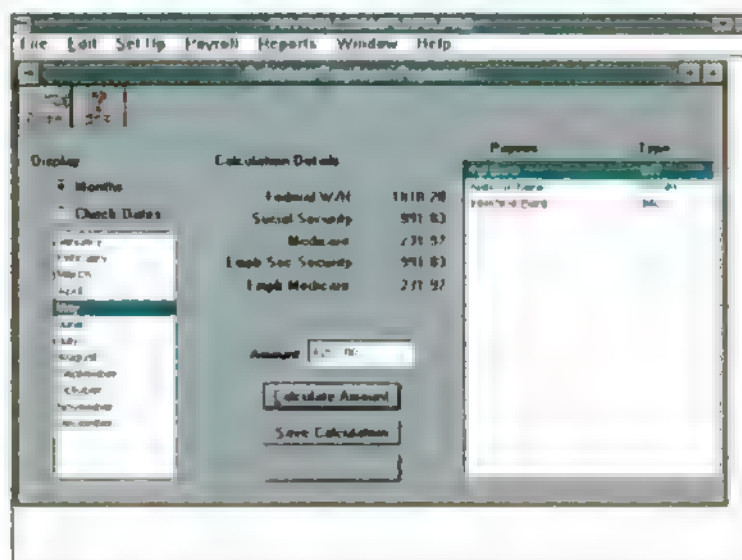
valuable addition.

► **CheckMark Payroll for Windows.** List Price: \$129. Requires: 2MB RAM; 2MB hard disk space, Microsoft Windows 3.1 or later. CheckMark Software Inc., Ft. Collins, CO 80525; 800-225-0522, 303-225-0522.

Circle 412 on reader service card



UPDATE: CheckMark's Employees screen lets you make changes to anyone's wage or tax information quickly.



CALCULATE: Figuring employer payments—such as quarterly withholding payments to the IRS—is a one-button operation within CheckMark.

salary and hourly wage rates to when the employee was hired and the last time he or she got a raise. More productive, however, are the numerous tax-related reports. Several, including those for the federal 940 form and state withholding, generate the numbers needed to complete paper forms by hand. In only two cases—

**Everything else
is either overpriced
or underfeatured.**

When you compare the premium monitors feature-for-feature and spec-for-spec, SuperScan wins hands down every time. Comparable monitors from NEC, Sony, Viewsonic, Mitsubishi and Nanao all cost more. Or deliver less.

So whether you choose your new monitor for its price or its performance, choose SuperScan. Either way you win.

Call for details.
(800) 441-4832.

NSA

	SuperScan Supreme 21	SuperScan Elite 21	SuperScan Elite 20	SuperScan 20s	SuperScan Elite 17	Super 17s	SuperScan Pro 15
Dot Pitch	0.26 mm	0.28 mm	0.28 mm	0.31 mm	0.26 mm	0.26 mm	0.28 mm
Max. Horizontal Freq.	110 kHz	90 kHz	90 kHz	69 kHz	82 kHz	64 kHz	64 kHz
Max. Resolution	1600 x 1200	1600 x 1200	1600 x 1200	1280 x 1024	1600 x 1200	1280 x 1024	1280 x 1024
Max. Refresh @ Max. Resolution	85 Hz	72 Hz	72 Hz	60 Hz	66 Hz	60 Hz	60 Hz
Energy Star/VESA DPMS	Yes	Yes	Yes	No	Yes	Yes	Yes
Suggested Selling Price	\$2,745	\$1,995	\$1,695	\$1,395	\$1,049	\$799	\$449

MPR II



**3-year
warranty**



SuperScan Elite 21

HITACHI

SuperScan®

An advantage you can clearly see.

Access Graphics (800) 733-9333. Computer Graphics Distributing (301) 921-0011. DSS (800) 231-4279. Gates/FA (800) 332-2222. Graphics Technologies (800) 999-9382. International Computer Graphics (800) 659-4244. Merisel (800) 637-4735. SED (800) 444-8962. Tech Data (800) 237-8931.

The ENERGY STAR™ emblem does not represent EPA endorsement of any product or service
CIRCLE 032 ON READER SERVICE CARD

Mapping

City Streets Can Tell You Where in the World You Are

BY BRUCE BROWN

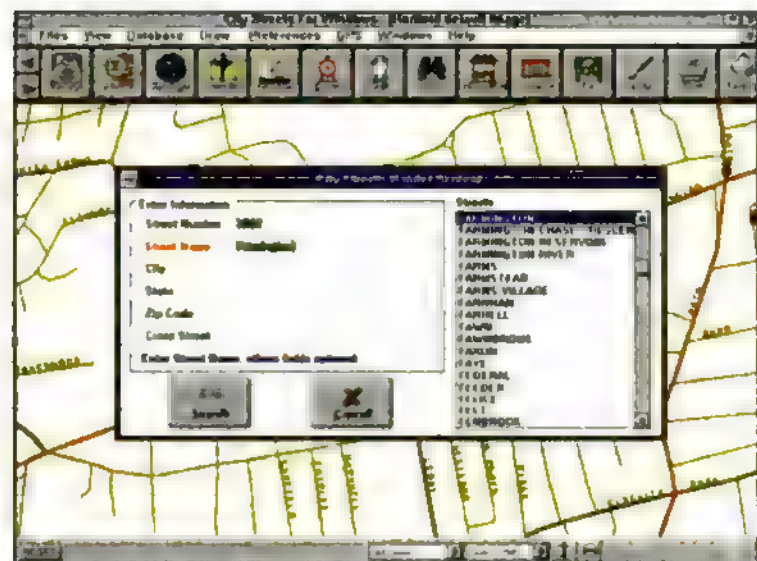
The right map at the right time can save you a lot of traveling time and agony. With Road Scholar's \$99.95 mapping program, City Streets for Windows, you'll be able to find your way around most cities in the world—especially when you use the program with the optional \$399.95 Marco Polo global positioning PCMCIA card. But be warned, the software in this case is better than they typical PC it will run on.

City Streets is an electronic

selected graphic at the location.

The program is also good at figuring out partial addresses, which makes it an extremely helpful tool for salespeople following up on leads.

By tracing a route from its starting point to its finishing point, you can get an accurate distance measurement. Unlike other recent mapping programs, City Streets won't figure the best or fastest route or give you directions, but you can augment the maps with text, landmark names, or descriptions.



ADDRESSES: To fix a location, just enter a full or partial address in the Finder Screen.

mapping program built around an extensive database of metropolitan area maps and includes search, display, and customization capabilities. You can do quite a bit with the software alone; it will enable you to view or print custom-designed maps drawn to a variety of scales, with varying degrees of street and route information.

FINDING AN ADDRESS

When you have the correct City Streets database loaded, you can point to a location on a map and the address will be displayed. Alternatively, you can enter an address in the search window and the program will find it and put a pushpin icon or another

additional metropolitan area map of your choice for free. You can buy extra maps for 180 U.S. metropolitan areas for \$29.95 each and maps of 80 European metropolitan areas for \$59.95 each.

POSITION AND SPEED

With the Marco Polo global positioning system (GPS) Type II PCMCIA card installed, City Streets becomes an interactive locating device that meshes well with the electronic maps. Not only are your current latitude and longitude coordinates displayed but City Streets places a tiny car graphic on the system's maps.

The GPS card, which is manufactured by Rockwell Inter-

national, has a 2-inch protrusion to which you attach a 10-foot antenna cable. At the other end of the cable is a small circular antenna mounted on a magnet.

To work, the receiver must have unobstructed, line-of-sight access to at least 3 of the 24 orbiting global positioning satellites in the GPS network, which the program calls "seeing the birds." There is no charge to receive the GPS signals, which are used for position information by commercial and

government ships, planes, and other vehicles. City Streets also works with other global positioning devices, such as the Trimble Navigation GPS Card.

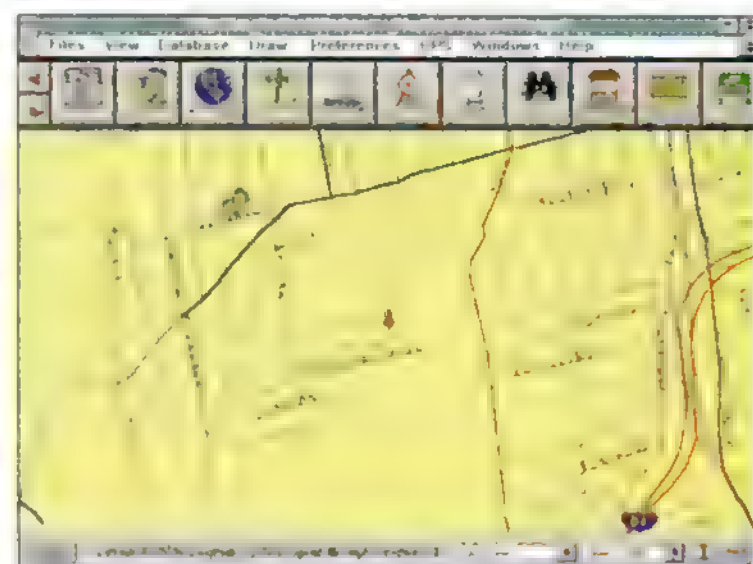
Once the initial location is established by the GPS card, a process that can take up to a minute or more, the position—accurate to within 30 feet—is updated in intervals of one second or longer. The current latitude, longitude, travel direction, and speed are listed below the map.

City Streets has a flexible database structure that allows the linking of additional data. For example, with information on local real estate, a realtor can focus on only those houses that are within a prescribed price range and geographical area for a potential buyer. In order to help in this area, the program includes a sampler CD-ROM from ProPhone of 1.5 million telephone numbers and addresses for New York, San Francisco, and Washington, DC.

WANTED: A GOOD SCREEN

Most of the problems with City Streets are not of its own making. Glare on the screen of the portable PC you're using is the biggest headache of navigating electronically; the images on a dual-scan passive-matrix color notebook computer get washed out easily by sunlight. An active-matrix color display is better, but glare can still overwhelm an image.

It isn't advisable to try to



GLOBAL POSITIONING: A small car icon follows your progress on the map, with longitude, latitude, direction, and speed listed on the bottom of the screen.

read any map while you're driving, and hard-to-read displays of notebooks in general make it even more dangerous. Our advice is to stop and get a navigation fix on the side of the road.

As long as you can see the screen clearly, City Streets is a useful, high-tech tool, good for everyone from vacationers to delivery and transportation personnel to emergency service workers. With the GPS card installed, City Streets can help anyone who instantly needs to know where they are and where they're headed.

► **City Streets for Windows.** List price: \$99.95; Marco Polo GPS card, \$399.95; extra U.S. city maps, \$29.95; extra European city maps, \$59.95. Requires: 2MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later; PCMCIA Type II or III slot for GPS card. Road Scholar Software, Inc., Houston; 800-426-7623, 713-266-7623; fax, 713-266-4525.

Circle 413 on reader service card.

STATISTICA/w

STATISTICA/w™ (for Windows) Complete Statistical System with thousands of on-screen customizable, presentation-quality graphs fully integrated with all procedures ■ Complete Windows 3.1 support, DDE, OLE, TT-fonts, multiple toolbars, right mouse button support ■ Unlimited numbers of data-, results-, and graph-windows ■ Inter-window integration: data, results, and graphs can be treated as objects and converted into one another in a number of ways ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques; multi-way tables with banners (presentation-quality reports); nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; time series modeling; forecasting; lags analysis; quality control; process analysis; experimental design (with Taguchi); and much more ■ Manuals with comprehensive introductions to each procedure and examples ■ Hypertext-based Stats Advisor expert system ■ Extensive data management facilities (spreadsheet with long formulas, block operations, advanced Clipboard support, DDE hot links, relational merge, data verification, powerful programming language) ■ Batch command language and macros also supported, "turn-key system" options ■ All output displayed in Scroll sheets™ (dynamic, customizable, presentation-quality tables with toolbars, pop-up windows, and Instant 2D, 3D and multiple graphs) ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, unlimited ANOVA designs) ■ Megafile Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited size of files; extended ("quadruple") precision; unmatched speed ■ Exchanges data and graphs with other applications via DDE or an extensive selection of file import/export facilities ■ Hundreds of types of graphs, including categorized multiple 2D and 3D graphs, matrix plots, icons, and unique multivariate (e.g., 4D) graphs ■ Facilities to custom design new graphs and add them permanently to menu ■ On-screen graph customization with advanced drawing tools, interactive stretching and resizing of complex objects, interactive embedding of graphs and artwork, special effects, icons, maps, multi-graphics management, page layout control for slides and printouts; unmatched speed of graph redraw ■ Interactive rotation, perspective and cross-sections of all 3D and 4D graphs ■ Extensive selection of tools for graphical exploration of data: fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ■ Price \$995.

Quick STATISTICA/w™ (for Windows) A comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/w ■ Price \$495.

STATISTICA/bos™ (for DOS) A STATISTICA/w-compatible data analysis system ■ Price \$795.

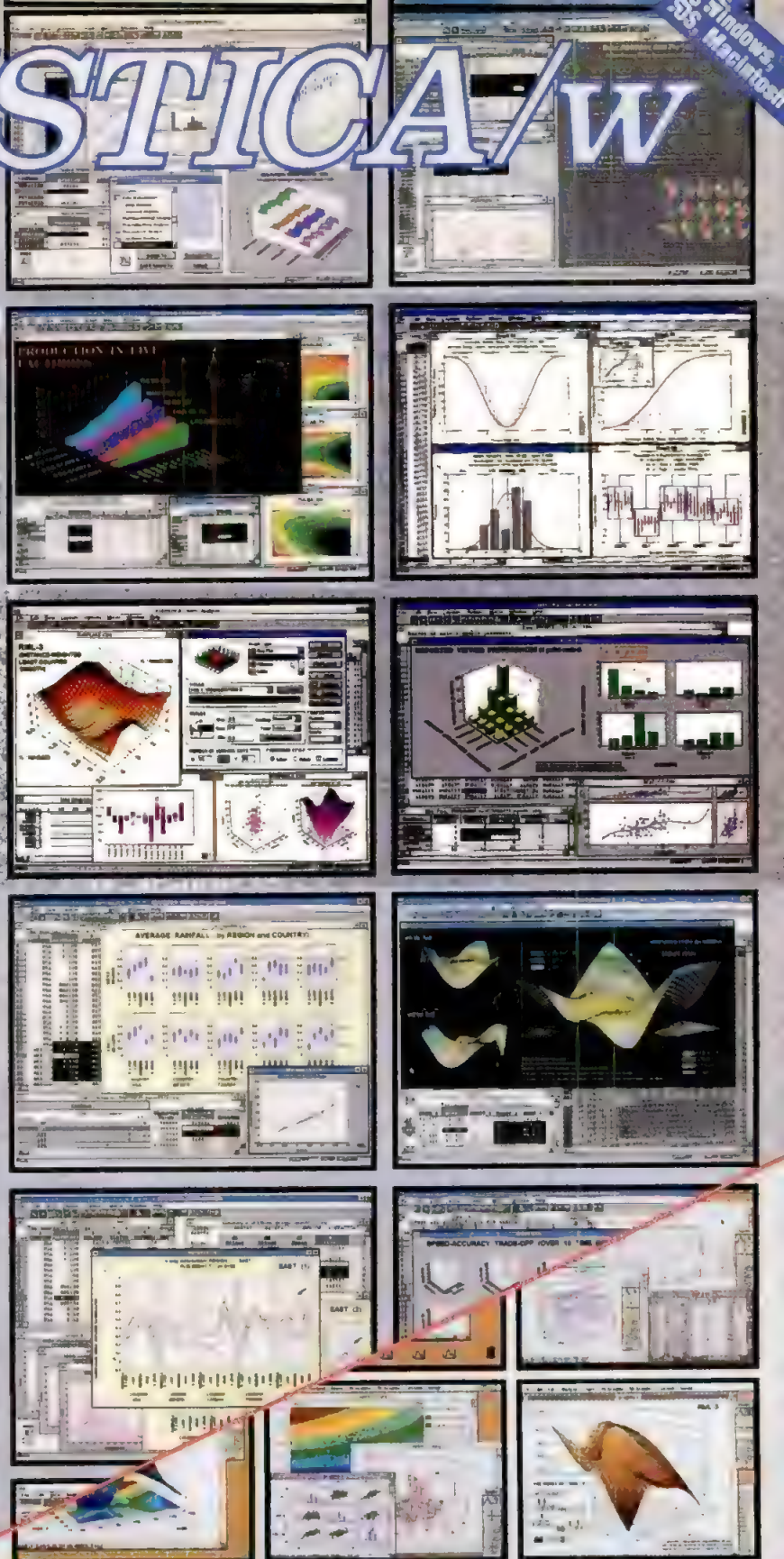
Quick STATISTICA/bos™ (for DOS) A subset of STATISTICA/bos statistics and graphics ■ Price \$295.

Domestic sh/h \$10 per product; 14-day money back guarantee.

CIRCLE 057 ON READER SERVICE CARD
StatSoft™

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149
Fax: (918) 583-4376

Overseas Offices: StatSoft of Europe (Hamburg, FRG): ph 040/4200347 fax 040/4911310 StatSoft UK (London UK): ph 0462/482822 fax 0462/482855 StatSoft France (ph 1) 45 66 97 00 fax (1) 45 66 06 51 StatSoft Pacific (Australia): ph (03) 663 6580 fax (03) 663 6117 Available from other Authorized Representatives worldwide Sweden: ph 018-240035 fax 018-210039 Finland: ph 24-334678 fax 24-333867 Belgium 10 61 16 28 South Africa: 12-663-4500 Japan (Macintosh) ph 03-3770-7600 Japan (Windows) ph 03-3667-1110
StatSoft STATISTICA/w Quick STATISTICA/w STATISTICA/bos Quick STATISTICA/bos STATISTICA/Mac Quick STATISTICA/Mac and Scroll sheets are trademarks of StatSoft, Inc.



STATISTICA/Mac™ (for Macintosh) A STATISTICA/w-compatible, comprehensive data analysis and graphics system designed for the Macintosh ■ Large selection of statistical methods fully integrated with presentation-quality graphics (incl. EDA, multiplots, a wide selection of interactively rotatable 3D graphs; MacDraw-style tools) ■ Unlimited size of files ■ Full support for System 7, incl. "Publish and Subscribe" ■ Price \$695.

Quick STATISTICA/Mac™ (for Macintosh) A subset of STATISTICA/Mac: a comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/Mac ■ Price \$395.

Look for us on all the major networks.

Word about PCs from Hewlett-Packard is getting around, and ratings are soaring. According to a recent CRN/Gallup survey, "Use of HP desktops in Fortune 1000 companies has doubled in the last year."

And with good reason. Our broad range of PCs not only meets users' expectations for power and ease of use, it also answers the needs of a network manager. With built-in features like on-board networking, advanced security and asset tracking, HP PCs have what it takes to be top performers on virtually any network. And soon our expertise in network management will reach all the way to the desktop, as we continue to pioneer the development of DMI (Desktop Management Interface).

For more information or the name of your nearest HP dealer, call us today at 1-800-322-HPPC, Ext. 8567. And tune in to the network superstars.

Give your other PCs something to look up to.

If you're connecting PCs to a network, scan this chart and you'll see it's time to hook up with HP.

STANDARD NETWORKING FEATURES	HP VECTRA XL PC	HP VECTRA M2 PC	COMPAQ DESKPRO XE	DELL NETPLEX
Advanced Bus Architecture	PCI	VL		
Integrated Networking Interface	32-bit	16-bit		
Integrated, multiprotocol Boot-ROM	X	X		
ISA Plug-n-Play Compliant	X	X	X	
Multilevel Security Features	X	X	X	X
Asset tracking	X	X	X	
PC tattooing	X	X	X	
Optional Desktop Management Software	X	X		
Bi-directional parallel port	X	X	X	X
Desktop Management Interface (DMI) ²	X	X		



**HP quality in
value-priced PCs.**

- Intel 33-MHz 486SX, 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive; Intel 60-MHz Pentium
- Chip upgrades to higher performance
- On-board accelerated local-bus video
- 210-MB hard drive¹
- 4 MB RAM, expandable to 64-MB
- 512 KB or 1 MB of Video RAM standard
- ISA Plug-n-Play compliant

**High-performance
network-ready PCs
in a slimline package.**

- Intel 33-MHz 486SX, 50- and 66-MHz 486DX2, upgradable to Pentium Overdrive
- Optional 128- or 256-KB second level cache
- 210-MB, 14-ms Fast-IDE hard drive¹
- 32-bit Fast-IDE local-bus hard disk interface
- 8-MB RAM, expandable to 96-MB
- Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution

**High-performance
PCs for the
connected office.**

- Intel 33-MHz 486SX; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive
- Optional 128- or 256-KB second level cache
- Four mass storage shelves; four expansion slots
- One available 32-bit VL-bus slot
- 210-MB, 14-ms Fast-IDE hard drive¹
- 32-bit Fast-IDE local-bus hard disk interface
- 8-MB RAM, expandable to 96-MB

**Exceptional 486
performance for advanced
business use.**

- Intel 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive
- PCI architecture
- Standard 256-KB second level write-back cache
- Four mass storage shelves; four expansion slots
- Two available 32-bit PCI expansion slots
- 210-MB, 14-ms Fast-IDE hard drive¹
- 32-bit PCI IDE hard disk interface

**The ultimate PC for
advanced business and
technical applications.**

- Intel 90-MHz Pentium Processor
- Second processor socket for MP Spec 1.1 multi-processing
- Standard 256-KB second level asynchronous or burst asynchronous write-back cache
- PCI architecture
- Four mass storage shelves (three front accessible); five expansion slots
- Two available 32-bit PCI expansion slots
- 270-MB, 12-ms Fast SCSI-2 hard drive¹



HP Vectra VL2

- Desktop Power Management
- EPA Energy Star certified
- Local bus Fast-IDE hard disk interface²
- 1280 x 1024 video resolution²
- Optional 128- or 256-KB cache memory²
- Free three-year limited warranty for parts and labor³



HP Vectra N2

- 1 MB of video RAM standard, expandable to 2 MB
- Slimline package with two mass storage shelves and three ISA slots
- Optional integrated 10Base-T networking
- Multilevel security
- EPA Energy Star certified
- ISA Autoconfiguration utility (Plug-n-Play)
- Integrated Desktop Management Interface (DMI)²
- Free three-year limited warranty for parts and labor³



HP Vectra M2

- Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution
- Optional integrated 10Base-T networking
- Systems Diagnostics Utility
- EPA Energy Star certified
- ISA Autoconfiguration utility (Plug-n-Play)
- Integrated Desktop Management Interface (DMI)²
- Free three-year limited warranty for parts and labor³



HP Vectra XM2

- 8-MB RAM, expandable to 96-MB
- PCI Integrated 64-bit S3 Vision-864 graphics accelerator supporting up to 1280 x 1024 resolution
- Optional PCI Integrated 32-bit 10Base-T networking
- Integrated Desktop Management Interface (DMI)²
- EPA Energy Star certified
- Free three-year limited warranty for parts and labor³



HP Vectra XU

- Integrated 32-bit PCI SCSI-2 interface
- PCI integrated 64-bit S3 Vision-864 graphics with 1280 x 1024 resolution or PCI MGA Ultima Plus graphics with up to 1600 x 1200 resolution
- 32-bit PCI IDE hard disk interface
- 8 or 16 MB of RAM, expandable to 256 MB
- PCI Integrated 32-bit 10Base-T networking
- Integrated Desktop Management Interface (DMI)²
- Free three-year limited warranty for parts and labor³

from
\$1,049¹

from
\$1,429¹

from
\$1,509¹

from
\$2,069¹

from
\$3,749¹



All HP Vectra PCs come with MS DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed, HP mouse and keyboard included. *Feature included with some models. 1 U.S. list price, dealer prices may vary. Monitor not included. 2 Other capacities available. 3 First year on-site, 24-hour service. Second and third year return to dealer. 4 Available 10/1/94. With permission CRN/Benchmark. MS-DOS is a U.S. registered trademark and Windows is a trademark of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. trademarks of Intel Corporation. PPG407 ©1994 Hewlett-Packard Company

Sony With Soul...

ADI.



ADI delivers the reliability and quality of Sony, without the brand name price.

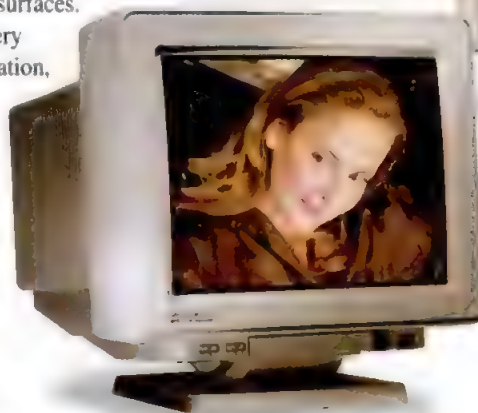
You want a top-of-the-line monitor. And you're looking at Sony MultiScans. But you have bottom line concerns, and you'd like to look at a cost-efficient alternative in the same league as Sony. Look at ADI MicroScan™. With microprocessor intelligence. 18-mode memory. Front panel digital controls. 76 Hz non-interlaced scanning for stunning, flicker-free images. Razor sharp resolution of up to 1280 x 1024. Special anti-glare, dark glass CRT surfaces.

And performance that meets or exceeds every standard for manufacturing, power conservation, ergonomics and safety. That's why three million ADI MicroScan monitors have been sold.

Then to sum up the differences, between Sony and ADI, look at the price tags. With ADI, the sum you save will let you go out

and buy a top quality TV set for your living room. Say a Sony.

For information on ADI, our monitors and our company, call (800) 228-0530 today. For faxed product information and editorial reviews, call (800) 767-8182



The ADI MicroScan 17" 5AP and 15" 4GP

- Microprocessor intelligence
- Fingertip front panel controls
- 76 Hz flicker-free refresh rate
- Brilliant, non-interlaced images
- Single-board design
- 2-year warranty

ADI

Any way you look at it.

ADI Systems, Inc. 2115 Ringwood Avenue, San Jose, CA 95131

MicroScan is a trademark of ADI Systems Inc. All other brands or product names are trademarks or registered trademarks of their respective companies. The Energy Star emblem does not represent EPA endorsement of any product or service. © 1994 ADI Systems Inc. All rights reserved



CIRCLE 226 ON READER SERVICE CARD

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Adam A. Hicks

NEW

Pump Up the Volume with an ADS FM Receiver for Your PC

Music lovers can tune in to FM stereo and more with their PCs. **Advanced Digital Systems** has created the Radio Rock-It RDS add-on board for PCs, which picks up FM frequency broadcasts and the new Radio Broadcast Data System (RBDS) subcarrier transmissions. This unique product for listening to music and looking at the text of radio broadcasts on your PC will begin shipping in October.

By adding this half-length ISA board to your PC and attaching speakers, you can receive radio broadcasts with the benefit of SRS surround sound and a five-band graphic equalizer. In addition to letting you listen to music, the board translates RBDS signals into text for display on your screen. These RBDS broadcasts use the signal's subcarrier wave to transmit data over the FM band; about 400 sta-



See closed-caption radio-text broadcasts on your PC with ADS' FM receiver card.

tions currently implement RBDS. The software lets you choose from three different displays; two that look like radios or another that streams text across the bottom of your screen in a ticker-tape fashion. Radio stations display all types of information, including their call letters, the song titles, and artists' names. The Radio Rock-It will also pick up your pager signals and function as an on-screen digital paging display system.

► **Radio Rock-It RDS.** Estimated price: Less than \$250. Advanced Digital Systems, Cerritos, California; 800-888-5244, 310-926-1928; fax, 310-926-0518.

Circle 402 on reader service card.

HOT PROSPECT



Wacom Puts a Pen in Your Hand With Compact ArtPad

The mouse is a poor substitute for a pen when it comes to drawing, and until now, the prospect of buying a full-size digitizing tablet has meant sacrificing valuable desk space and an investment of between \$500 and \$4,000. Wacom, a leading manufacturer of professional graphics tablets, has cut the size and the price of creating digital art on your PC with the \$199 ArtPad. The only thing that separates the ArtPad from its larger, more expensive Wacom siblings is its compact 4- by 5-inch sketching area.

The ArtPad can link to your Macintosh or PC system via an RS-232 cable and a serial port. It is compatible with packages for drawing and graphics design, and you can also use it instead of a mouse for pointing and clicking in any Windows application. Wacom includes the same 8-gram wireless UltraPen with the ArtPad that you'd get if you purchased a larger tablet.

The tablet has a maximum report rate of 205 points per second and provides 2,540 lines per inch of resolution. The Wacom ArtPad is a welcome solution for graphic artists who are looking for a home tablet or for beginners who are looking for an economical way to explore a more artistic side.

► **Wacom ArtPad.** List price: \$199. Wacom Technology Corp., Vancouver, Washington; 800-922-6613, 206-750-8882; fax, 206-750-8924. Circle 401 on reader service card.

NEW

PCMCIA Wild Card: Cellular Modem and Ethernet Adapter

Getting information from your office's network to your notebook—and vice versa—has never been easy. You can connect directly via a LAN adapter or call in to the server. The Jack of Diamonds PCMCIA card from **Ositech Communications** will let you use one card to accomplish both tasks. The Type II PCMCIA card is a modem and Ethernet adapter that will take up only one of your notebook's slots. The modem is available in either 14.4-Kbps or 28.8-Kbps models and is equipped with V.42bis compression and cellular-compatible MNP 10 error-correction protocols. The Ethernet adapter can be purchased in a 10baseT version or a combination version of 10baseT and 10base2 card or 10baseT alone. The included drivers will work with a variety of operating systems, included software will detect the appropriate wiring for your connection type, and power-management software will detect when the modem is not in use to conserve the notebook's battery.

► **Jack of Diamonds.** List price: With 14.4-Kbps modem, \$549; with 28.8-Kbps modem, \$749. Ositech Communications Inc., Guelph, Ontario, Canada; 800-563-2386, 519-836-8063; fax, 519-836-6156.

Circle 403 on reader service card.

NEW

ArtiSave Extends Hardware Compatibility to Colorado

Artisoft's ArtiSave Backup line has a new software product that provides LANtastic users more hardware options for backing up their networks. The package now supports some of the most popular backup hardware, including Mountain Network Solutions' TD-250 internal minicartridge drive, Side Car and Side Car II parallel port tape drives, and Colorado Memory System's best-selling Jumbo 250 minicartridge tape drive. There is also a new bundled package that pairs ArtiSave with the TD-250, which reads and writes up to 250MB of data in QIC-80 format, providing a complete backup solution that costs less than \$400. By expanding compatibility, Artisoft's backup solu-

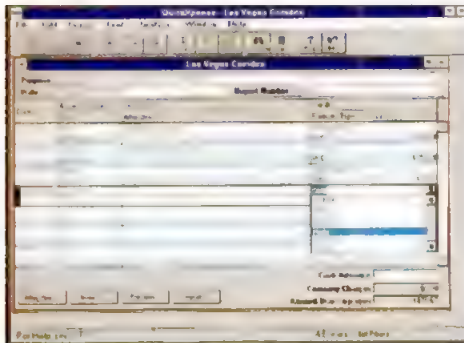
tion expands flexibility for users who have committed to the LANtastic networking environment and want to use popular hardware solutions without complicated backup procedures.

► **ArtiSave Backup.** List price: *Software only, \$199; with Mountain TD-250 tape drive, \$399.* Artisoft Inc., Tucson, Arizona; 800-233-5564, 602-670-7100; fax, 602-670-7101. Circle 404 on reader service card.

NEW

Portable Software Takes the Pain Out of Expense Reports

The new software package from **Portable Software**, called QuickXpense for Windows, will take your paper expense report forms and transform them into an electronic data collection program for easy entry, processing, and analysis. The software handles all dating and categorizing, so all you have to do is enter expenses. The program has receipt templates that prompt you for required data, as well as Autofill and Smart Copy features that fill in repetitive information



QuickXpense for Windows turns paper expense reports into easy-to-use data-entry fields.

much faster. QuickXpense is compatible with VIM e-mail software, enabling you to send expense reports to managers who can then study the data for detailed analysis of expenses and tracking of outstanding reimbursements. Other features include links to contact lists for IRS reporting, foreign currency conversion, mileage calculation, and expense itemization. You can choose from one of the 15 preformatted forms included, or Portable Software will take your current expense form and turn it into a Quick-Expense database for a \$49.95 processing fee. The service is free to any Fortune 1000 company who purchases the package or with any purchase of two or more packages.

► **QuickXpense for Windows.** List price: \$99.95. Portable Software Corp., Redmond, Washington; 800-626-8620, 206-881-9393; fax, 206-881-4253.

Circle 405 on reader service card.

BRIEFS

Software

CoStar Corp. could help solve some addressing headaches with AddressMate for Windows. The \$69.95 software runs as a standalone package or from within Microsoft Word, Ami Pro, or WordPerfect. AddressMate is an address manager combined with a layout manager for storing, searching for, sorting, and outputting names and addresses. Using AddressMate, you can produce various forms such as letters, envelopes, and labels. The software lets you import contact information directly into letters and mail-merges without the cutting and pasting that is necessary in some other contact managers. 800-426-7827, 203-661-1540

We all like to know how much money we have on hand, but with **BottomLine** from **end-if Software**, you're able to estimate your future cash flow. This \$149 cash flow manager collects information about accounts receivable, accounts payable, and your budget to create an estimate of projected cash status for up to a year in advance. Use it to keep track of a small business, departmental budgeting, or to make plans for important purchases for your home. 800-227-4350, 916-671-6700

Ray Dream created 3-D illustration software for professionals, and now brings us addDepth. This \$149 software automatically turns fonts and graphics into 3-D art objects to add to newsletters, reports, brochures, and presentations. The package lets you create 3-D images from scratch with the help of a design "Wizard," import 2-D clip art and illustrations from graphics arts packages like CorelDRAW and Adobe Illustrator for transformation into 3-D art, and choose from a library of pre-designed 3-D templates. Once created, the 3-D graphics can be previewed in full color and exported to other applications. 800-846-0111, 415-960-0768

If you have not been satisfied with any of the front end software packages that are available for MCI Mail, **Common Sense Solutions** has upgraded its Dispatch for MCI Mail (\$45). The latest release, Version 1.3, has a termi-

NEW

Hierarchical Logic Comes to the Personal Computer

The time has come to implement logical storage management for personal computers, and Personal Archiver from **Chili Pepper Software** keeps track of file activity. It may seem like overkill to apply Hierarchical Storage Management to your PC, but with bigger hard disks, file management is becoming a bigger job than you can do in your head. Personal Archiver keeps track of all file accesses and lets you set rules that will determine when files should be sent to disks or other off-line storage. Although the files are no longer on your hard disk, Personal Archiver shows a list of archived files as if they were still in memory. If you call an archived file, the program remembers its location and will prompt you for the correct source. To give you an idea how useful it is, Personal Archiver also lets you graphically analyze the amount of hard disk space you saved by archiving files.

► **Personal Archiver.** List price: \$49.95. Chili Pepper Software, Atlanta; 800-395-1812, 404-339-1812; fax, 404-513-7411.

Circle 406 on reader service card.

NEW

Retro Technology Provides Better Teleconferencing Solution

Teleconferencing is cutting edge, but using older glass-lensed, manually adjusted cameras like those offered by **Howard Enterprises** may in fact give you better teleconferencing throughput. The cameras that are bundled with the growing numbers of videoconferencing systems are designed to be inexpensive, so they use plastic lenses and all automatically adjust the iris setting and the white balance. On the other hand, Howard's TeleCameras use better glass lenses, add circuits to their processing board for picture-quality compensation, and allow you to manually adjust iris settings and white balance settings. The logic is that if the camera captures better-quality images and it is not constantly adjusting for subtle changes in shadows, there will be less overall data transmitted. By sending only important changes in images, you will get faster transmission. The TeleCameras are available in NTSC and PAL versions and offer optional built-in microphones.

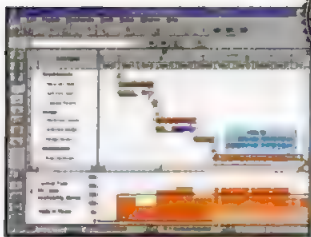
► **TeleCamera.** List price: \$470 to \$528. Howard Enterprises Inc., Camarillo, California; 805-383-7444; fax, 805-383-7442.

Circle 407 on reader service card.



SOONER OR LATER, MS-PROJECT WILL CRAMP YOUR MANAGEMENT STYLE.

Only Project Scheduler 6
gives your projects the
ideal environment
to grow in.



Why be baited into software
that starts out easy to use, but
ultimately compromises your
ability to efficiently plan, track,
evaluate and report
all of your project
management data?



Choose Project Scheduler 6® for
Windows™ and get the tools and
professional project management
insight to effectively handle all of
the changing deadlines,
schedule crunches and
resource allocation
problems that happen in
the real world.

"Aimed at users who
don't [necessarily] manage
projects full-time, but want a
product that won't run out of
steam, [Project Scheduler 6]
surpasses Microsoft Project and
CA SuperProject – in addition to
challenging many high end
packages," wrote *InfoWorld*."

So whether you're managing
one or one hundred projects, all of
your activities are streamlined
with a single, unlimited resource
pool, task and resource calendars,

user-configurable
spreadsheets, plus
interactive graphics
and icons for quick
access to functions and
views you use the most.

Sophisticated model-
ing features like the
Advanced Resource
Tracking Spreadsheet
(ARTS)™ let you
uniquely evaluate
resource costs and
usage on a period-by-period
basis. Evaluating multiple
"what-if" scenarios is a breeze
with Project Scheduler's ability
to do multiple undo/redos. And
our built-in object-oriented report
writer offers outstanding layout
versatility

You can even selectively share
project data with other ODBC-



Before you make a project
management software
decision, call for this free
executive summary.

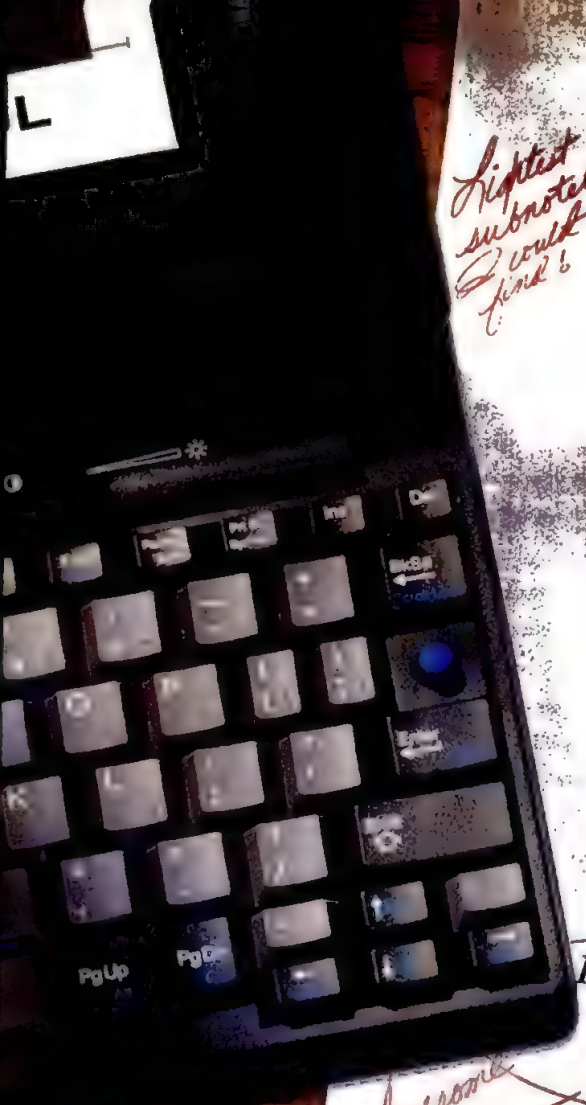
Call 1-800-533-9876

compliant applications.
Now in its second
generation, Project
Scheduler's Open
Database Connectivity
helps build greater
data reporting
efficiency and controls
throughout the
enterprise.

Don't get caught
short by the lure of
software that won't
completely support your projects
downstream. Get Scitor on the
line, and try Project Scheduler 6
for Windows today

Scitor
Corporation

© 1994 Scitor Corporation, 393 Vintage Park Drive, Suite 140, Foster City, CA 94404. Tel. 415-570-7700. Internet: sales@scitor.com. In France: call (1) 43 29 44 37. In Germany: call 0 69-6 66 80 25. In the United Kingdom: call 0384 391121. In Australia: call 61 2 956 7800. In South Africa: call 27 11 886 3863. Project Scheduler 6 is a registered trademark, and ARTS and the Scitor name are trademarks of Scitor Corporation. InfoWorld, January 1, 1994. Microsoft Project and Windows are trademarks of Microsoft Corp. CA SuperProject is a trademark of Computer Associates. No fish were subjected to undue cruelty, such as using Microsoft Project, during the making of this ad.



Lightest subnotebook I could find!

HANDBOOK® 486

- **2.94 Lbs.**, 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 or DX2 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 130MB or 250MB IDE Drive
- External 3.5" Diskette Drive
- 7.9" Backlit VGA Display
- 2 NiMH Batteries & AC Pack
- **Suspend/Resume Feature**
- 1 PCMCIA Type II Slot
- **EZ-Point™** Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2® Ports
- **Leather Carrying Case** - *cool!*
- MS Works™ 3.0 or Office Professional 4.3
- MS-DOS® 6.22, WFW 3.11 & Serial Transfer Cable



Coolness!

*8-20-91 - 11:20 AM (31) 21
Talked to [unclear] [unclear]
She [unclear] [unclear]
No paper [unclear]*

*Rolling Stone
15th [unclear]
[unclear] [unclear]*

HANDBOOK 486SX-25

4MB RAM, 130MB Hard Drive, Works
\$999

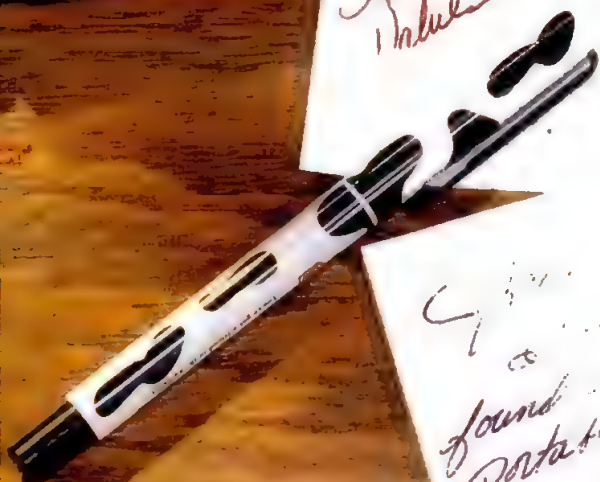
HANDBOOK DX2-40

8MB RAM, 130MB Hard Drive, Works
\$1499

HANDBOOK DX2-50

8MB RAM, 250MB Hard Drive,
MS Office Professional
\$2499

*Awesome
in blue*



*Found
Portable*



© 1991 Hewlett-Packard Company. ColorBook 486SX-25 is a registered trademark of Hewlett-Packard Company. You can't find it anywhere else. Available for approved credit customers only. IBM, MS-DOS, and MS Office are trademarks of International Business Machines Corporation. The Intel Inside Logo and Intel are trademarks of Intel Corporation. All prices and specifications are subject to change without notice.

And That's All She Wrote

COLORBOOK™

- 5.7 Lbs., 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486, DX2 or DX4 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 3.5" Diskette Drive and Removable 250MB or 340MB IDE Drive
- 10.3" or 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots (1 Type III)
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial, PS/2 & VGA Ports
- MS Works™ 3.0 or Office Professional 4.3
- MS-DOS 6.22 & WFW 3.11

COLORBOOK 486SX-33

4MB RAM, 250MB HD, Case, Works
Ask about our *48-Hour Quick Ship program.
\$1999

COLORBOOK DX2-40

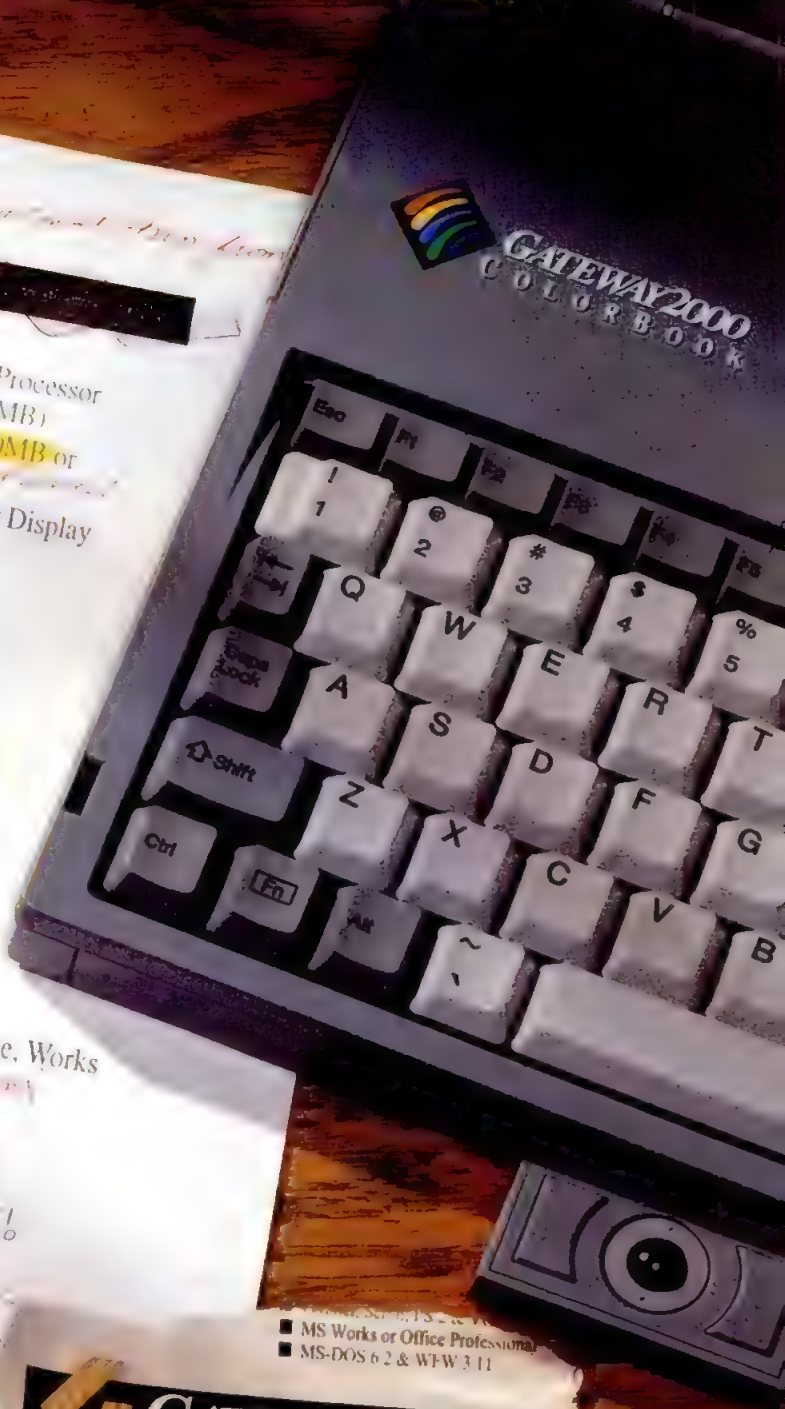
4MB RAM, 250MB HD, 96/24 Fax/Modem, Case, Works
\$2699

COLORBOOK DX2-50

8MB RAM, 250MB HD, 96/24 Fax/Modem, Case, Office Professional
\$3199

COLORBOOK DX4-75

8MB RAM, 340MB HD, TelePath™ 14.4K Fax/Modem, Case, Office Professional
\$3699



GATEWAY2000

"You've got a friend in the business."

- MS Works or Office Professional
- MS-DOS 6.2 & WFW 3.11



800-846-2063

NEW

Explore Multimedia with Aztech's Upgrade Kit

If you're on a quest to upgrade your PC to a multimedia system, the **Aztech Labs' Explorer upgrade kit** with double-speed CD-ROM drive and wavetable sound card is worth an investigation. Aztech is one of the biggest sellers of sound cards, and the one included in this kit uses the Yamaha OPL3 chip to provide wavetable MIDI sound for your multimedia excursions. The 16-bit ISA card includes features such as 2MB of ROM memory, selectable sampling rate up to 44.1 kHz, and digital recording and mixing capabilities. The external top-loading CD-ROM supports 8-bit I/O data transfer and can play music CDs from a single play button, so you don't have to use software to listen to music. The kit is MPC 2-compliant and is compatible with most popular sound standards.



The Explorer upgrade kits lets you journey into the world of multimedia with wavetable sound.

► **Explorer Deluxe.** List price: \$499. Aztech Labs Inc., Fremont, California; 800-886-8859, 510-623-8988; fax, 510-623-8989.

Circle 408 on reader service card.

NEW

Software for Managers Who Wear Several Different Hats

Most management software assumes you manage only one type of task, but **One Click Manager** from **Austinsoft Corp.** combines five aspects of managerial tasks in one package. One Click Manager has modules for planning, organizing, staffing, directing, and controlling your small business or workgroup. The planning portion handles your budgeting and marketing agendas, along with break-even analysis calculations and competitive strategy needs. For organizing, you'll find a contact manager and an appointment calendar. The

BRIEFS

Software

nal mode option that can copy screen text to incoming message folders. The address book has been enhanced so that it now accepts terminal mode addresses directly, stores addresses for mailing to other on-line services and the Internet, and even estimates the cost of sending a message and attachments to other MCI Mail accounts. 309-667-2772.

Computer Security Corp., makers of Dr. Solomon's Anti-Virus, have created Dr. Solomon's Audit to provide network managers with security against unlicensed and out-of-date versions of software spread across the network. The Windows software is available in packs of 20-, 50-, or 100-user licenses starting at \$795. Using the software lets an administrator keep a library of software packages and a record of their location on the network, including any proprietary developed systems that may exist. Once the software is identified, the management features let a LAN manager analyze usage and create reports to plan for upgrades or additional purchasing needs. 714-470-0048.

Hardware

Volex Interconnect Systems has released a flat PC plug designed to be a space-saving and safe electrical cord alternative. The FlatPlug computer cord (\$7 to \$9 depending on length) makes it easier to pull cords through tight spaces (for instance, between your desk and the wall) that won't accommodate normal plugs. The flat design of the plug makes the head of the plug sit flush against the wall socket, so it can only be removed using the pop-up safety ring. The safety ring makes it easier for you to remove the cord but impossible for children to tamper with. 408-945-7766.

Konica has an all-in-one solution for the home office that handles printing, faxing, and copying. The Konica 7310 is a printer that connects via a parallel port and also acts as a standalone fax and copy machine. The \$3,695 unit copies at 10 CPM (Copies Per Minute) for 8.5- by 11-inch pages and will handle letter- and legal-size paper, but it

staffing module has applications for helping you interview potential employees and evaluate performance once they've been hired. In the directing module, your quality control, goals for improvements, and action planning can be thought out and tracked. Every manager is interested in the bottom line, so the controlling module has a general ledger that will also keep track of budget variances.

► **One Click Manager.** List price: \$69. Austinsoft Corp., Austin, Texas; 800-501-1333, 512-502-1333; fax, 512-502-1233.

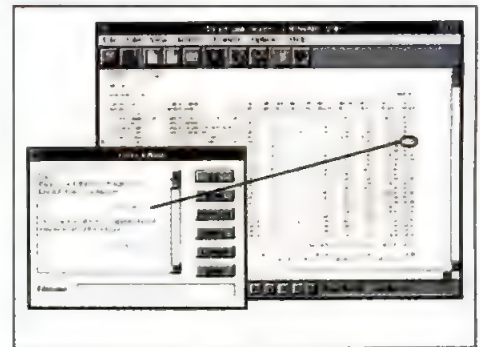
Circle 409 on reader service card.

NEW

Legacy Systems are Outdated But Legacy Data is Still Vital

Mainframe technologies are considered legacy because they are not as flexible as today's organizations, but with a data-access tool like **SmartLook** from **STS Systems**, you can give new life to old data. This windows-based package lets you generate on-line reports that can be analyzed, annotated, and processed according to the needs of multiple users. Without spending lots of money programming SQL queries or printing mounds of paper, individuals can search through large quantities of data within the reports they've generated and then easily format it for their business needs. You only have to deal with the data you need, which you can export to spreadsheets and databases. The package consists of an Editor module for creating templates and defining sorting criteria; a Translator module that indexes all data pulled from the legacy system, making it searchable; and a Viewer module for end-users. The viewer displays three different views: an on-screen view of the report page by page, a view of the relevant section only, or a customized view for focusing on what is most pertinent and can be purchased separately priced according to quantity purchased.

► **SmartLook.** List price: All three modules,



With electronic versions of report data notes can be transferred more quickly.

FOR WINDOWS

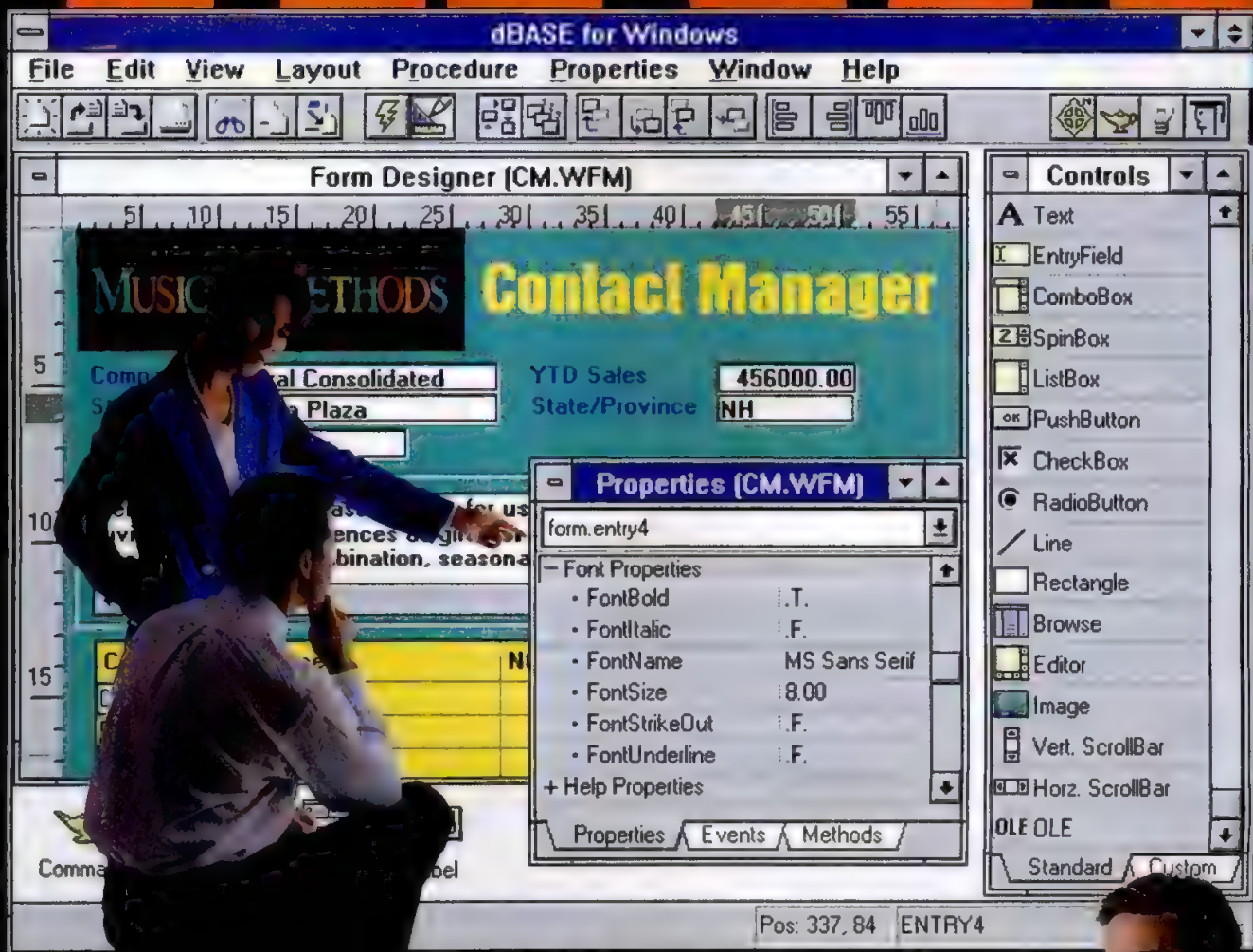
**the
future
is here!**

- It's Windows
- It's Object-Oriented
- It's Client/Server

And it's what you already know!

MPA

*The best way to build Windows
database applications*



*"With just a few mouse clicks I can create
great-looking forms very easily, using
tools that automate the work for me."*

—Smith Barney Shearson





WINDOWS

Unmatched compatibility is just the beginning

Whether you want to create stunning forms and reports, develop professional Windows database applications, or use information stored in remote databases, only dBASE[®] for Windows gives you the tools you need ... using knowledge you already have. Your investment is secure because your existing dBASE data, applications and knowledge all move forward into Windows. You can even use the new Component Builder[™] to give your existing applications a graphical look. And dBASE for Windows and dBASE for DOS can be run concurrently by different users on a network. But compatibility doesn't begin to capture the excitement of the new features you simply have to see to believe.

New features make managing your data easier

dBASE for Windows takes full advantage of Windows. Powerful, new, visual tools like the Navigator and Catalog Window let you view, organize and run all your tables, queries, forms, reports, labels, programs and related files, just by pointing and clicking with your mouse. The new Visual Query Designer and SpeedFilter[™] technology returns answers fast, even when you're searching multiple tables. The FormExpert[™] helps you create great-looking forms. And with SpeedMenus[™], Object Inspectors[™], Interactive Tutors[™] and On-line Help, you'll be up, running and seeing productivity gains right away.

Upsize to client/server using what you already know

While you may not think of yourself as a developer, dBASE for Windows' superior design tools make it easy to create your own applications. Unique Two-Way-Tools[™] create dBASE code for you automatically and even let you work interchangeably between your visual design tools and dBASE code. There are even prebuilt "objects" for you to use, or modify with simple point-and-click commands. Put the new objects together and you've just created a new, fully functional, Windows application.

And dBASE for Windows is the only database that provides a smooth transition into the client/server environments of the future. That's because we make it as easy to access and use remote SQL data as it is to use your local dBASE data.

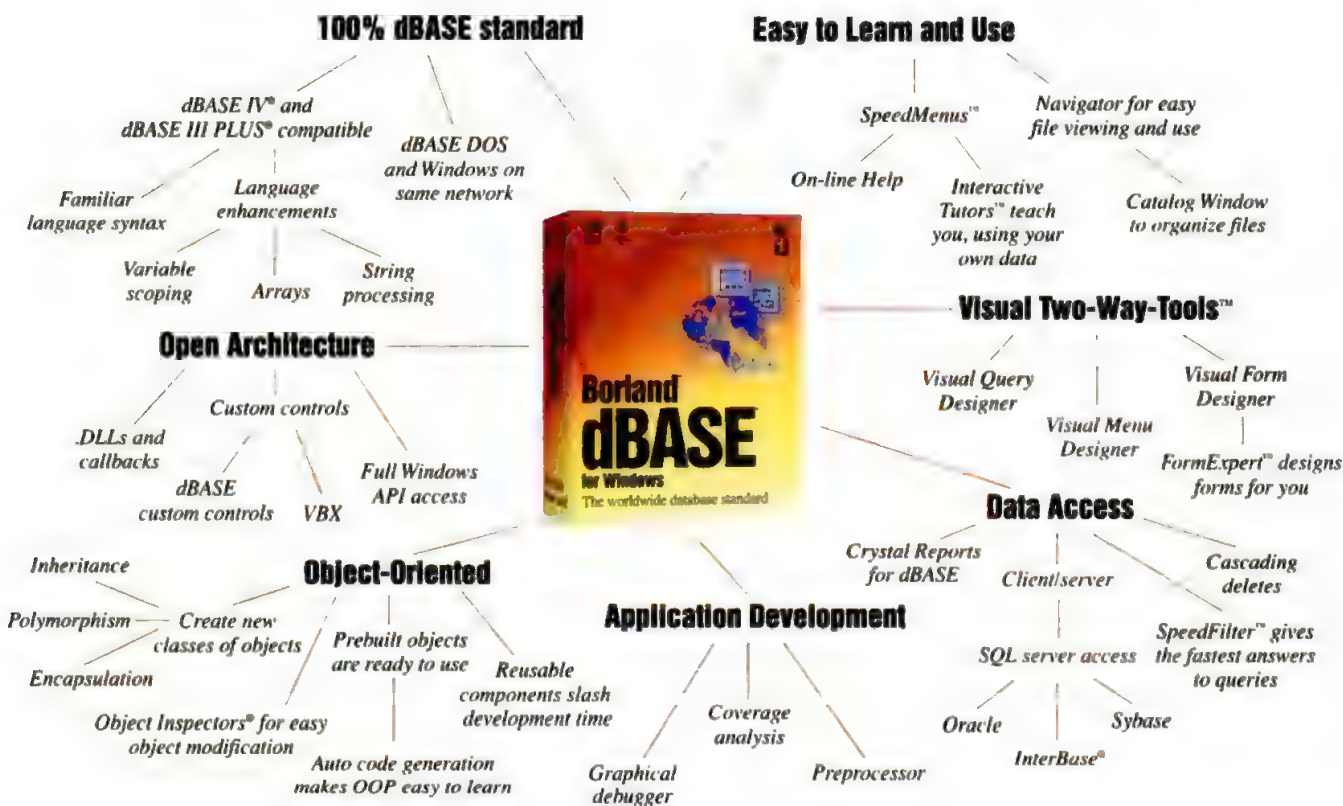


Borland
The Upsizing Company

Your path from DOS to Windows and Client/Server is here! Call now

1-800-336-6464 ext. 8987

dBASE developers: it's everything you asked for



dBASE® for Windows dramatically leverages the knowledge, applications, and data of the seven million dBASE users worldwide. It moves you from DOS to Windows and client/server in a single step.

And it pioneers new levels of productivity for everyone who works with information. dBASE for Windows again sets the standard for data management and database application development.

Upgrade Now!

The best way to build Windows database applications.

\$199⁹⁵
UPGRADE



\$149⁹⁵
UPGRADE



■ dBASE Windows

■ dBASE 5.0 for DOS

dBASE Training Videos

- Learning dBASE for Windows
- Developing with dBASE for Windows



\$49⁹⁵
\$49⁹⁵



Your path from DOS to Windows and client/server is here, CALL NOW!

1-800-336-6464, ext. 8987

FastFax 1-800-408-0001

Certification 1-800-353-2211

Canada 1-800-461-3327

Borland
The Upsizing Company

Copyright © 1994 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. Prices good in the United States and Canada only. All prices are in U.S. dollars. Dealer prices may vary. BI 7496
CIRCLE 220 ON READER SERVICE CARD

New & Improved

\$995. STS Systems Inc., Poite-Claire, Quebec, Canada; 800-517-6278, 514-426-0822; fax, 514-426-0824.

Circle 410 on reader service card.

NEW

Speech Systems' PE 500 Speaks Development Language

Now that speech-recognition technology has challenged arguments about insufficient vocabularies and outrageous price tags, **Speech Systems** has released the Phonetic Engine 500 Speech Recognition System (PE 500). This new product is designed for creating new speech-recognition-capable applications and updating existing systems to be speech-recognition enabled. The runtime system is a speaker-independent, continuous-speech-recognition software package with a 40,000 word active vocabulary that is based on an ISA/EISA-compatible add-in card. The package is voice activated, includes a noise-canceling headset microphone, and uses a digital signal processor to interpret phonetic codes of individual speakers. The Development Kit contains tools to develop speech-aware Windows-based applications as well as a ProVoice tool for making your current applications accept speech input when used with the runtime version of the PE500. ► **Phonetic Engine 500 Speech Recognition System.** List price: *Run-time System*, \$595; *Development Kit*, \$995. Speech Systems Inc., Boulder, Colorado; 303-938-1110; fax, 303-938-1874.

Circle 411 on reader service card.

IMPROVED

Total Graphics Control with Integrated HiJaak Utilities

Inset has upgraded its powerful graphics utility software, HiJaak PRO, and surrounded it with other graphics tools to create the HiJaak Graphics Suite, Version 3.0 for Windows. The HiJaak you get in the Graphics Suite now supports raster-to-vector conversions, including a choice between centerline or outline conversion, color control, and the ability to undither an image prior to tracing it.

Along with the improved HiJaak PRO you get the HiJaak Browser, which acts as a file manager for any file type, lets you view multiple thumbnails of files, and acts as a launch pad into other applications. The Browser supports .AVI, .FLI, .MIDI, .WAV, and QuickTime files. Using the HiJaak Smuggler, you'll be able to search for, retrieve, and view files from over 70 for-

BRIEFS

Hardware

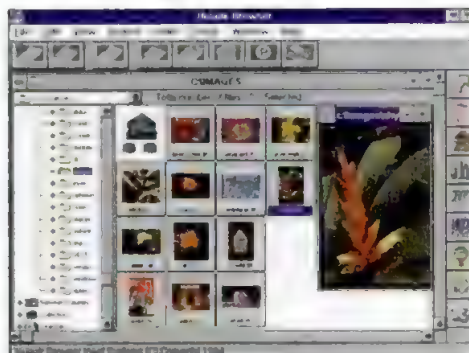
will also allow you to single-feed envelopes or special stock paper. For faxes you'll get 300-dpi printing resolution, 200-dpi scanning resolution, and 16-level gray scaling. The fax machine includes a 30-sheet document feeder and 256K of memory that can store up to 10 pages of text in case you run out of paper. Of course, since it is hooked to your PC you can use it as a printer, complete with 1MB of memory (upgradeable to 5MB) and HP LaserJet III emulation. 800-256-6422, 203-683-2222.

E-Comms has a new piece of equipment for linking environmental indicators—such as heat sensors—to the LAN. The E-LOG is for use in conjunction with E-Comms' E-Commander hardware and software system. The \$1,095 rackmountable unit collects information from environmental sensors and sends them off to the E-Command center, which periodically polls the E-LOG. All information about the room conditions is then relayed to the Windows-based software center in order to alert the LAN manager to any hazardous conditions that have occurred. 800-247-1431, 206-857-3399

And Finally. . .

Radish Communications Systems announced that **Cirrus Logic**, **Digital Sound Corp.**, and **GVC Technologies** have joined many other modem manufacturers by licensing Radish's VoiceView technology. VoiceView-enabled modems will be able to access voice mail, fax, and text messages with a single phone call from a desktop or portable PC. . . **Compaq Computer Corp.** has dropped the prices of its ProLinea, Deskpro, and Contura lines of PCs from 11 to 22 percent, which means prices will drop about \$300 on most models. . . **Vis-A-Vis** now includes a free copy of Vis-A-Vis Buddyware with every purchase of Vis-A-Vis for Windows document conferencing and shared whiteboard software. The Buddyware will receive Vis-A-Vis transmissions (but will not make calls) so you can share with clients even if they don't use Vis-A-Vis.

mats while you're working in other applications. Also in the suite are two art tools: HiJaak TouchUp for editing raster images and Micrografx's Windows Draw vector editor. These packages provide the tools for creating and editing images with graphic arts tools and



The HiJaak Graphics Suite includes the HiJaak browser for viewing thumbnails of multimedia files.

effects such as blur image, smooth, and flip.

► **HiJaak Graphics Suite, Version 3.0 for Windows.** Street price: \$99; upgrade from HiJaak PRO 2.0, \$49.99. Inset, Brookfield, Connecticut; 800-374-6938, 203-740-2400; fax, 203-775-5634.

Circle 414 on reader service card.

IMPROVED

Software-based Sound Studio

If you have not yet heard of **Innovative Quality Software** you should listen up, because they can do a lot for the way you put sound together on your PC. The Software Audio Workshop (SAW) multitrack sound-editing software is now in Version 3.0. You can use the software with any 16-bit audio card to produce 8-track stereo output.

Innovative has also created the SAW Utilities Rack #1, which is like a small library of audio-effects utilities. The package includes a File Format Converter, which converts between .WAV and .SND files and helps you manage audio files; an Audio Compressor/Limiter, which performs four different volume processing functions; an Equalizer, which provides seven bands

of frequency control and filter; an Echo Effects Generator, which creates various digital delay and repeating echo effects; and an Auto Panner, which lets you apply pan effects that give the illusion of motion to your sounds.

► **Software Audio Workshop, Version 3.0.** List price: \$599. SAW Utilities Rack #1. List price: \$349. Innovative Quality Software, Las Vegas, Nevada; 702-435-9077; fax, 702-435-9106.

Circle 415 on reader service card.

We Mean Business.



Price and performance are key factors when making business buying decisions. Perhaps that explains why Corporate 1000 companies are making the move to the ViewSonic 15G monitor. This new 15" monitor (13.9" diagonal viewable area) is an extraordinary value with features normally available only on large, expensive models.

Talking about business, we developed this 15" monitor to be *the* answer for your display requirements. The multifrequency ViewSonic 15G features a flat square screen, a fine 0.28mm dot pitch and special coating to reduce glare and reflection. It also has a unique digital control system which adjusts screen size, position and geometry. Plus, it offers a special tilt control to precisely align the image, and our ViewMatch™ for matching screen color to printer output.

Combining its intense colors and sharp, crisp images, this high performance monitor also delivers resolution up to 1,280 x 1,024. Your employees will appreciate the superb quality of the monitor, while your accountant will appreciate the price!

In keeping with today's concern for the environment, the ViewSonic 15G is both low radiation MPR-II and EPA Energy Star compliant. This monitor powers down to under 5 watts when inactive, which saves energy and lowers your electric bill.

Successful business people are savvy buyers – that's why they're rushing out to buy the ViewSonic 15G . . . they See The Difference!



ViewSonic®
See The Difference!™

Tel: (800) 888-8583 or (909) 869-7976 Fax: (909) 869-7958
Call FaxSonic at (909) 869-7318 (fax-on-demand)
Request Doc. 146 (15G)
Applelink: VIEWSONIC Compuserve: 73374,514

All products and trademarks are brand names of their respective companies.
The EPA only promotes energy efficiency and does not endorse any particular company or product.

COMDEX®
FALL '94
BOOTH L2662



ViewSonic 17



ViewSonic 17



July 1993



ViewSonic 21



April 1994



ViewSonic 17



January 1994
ViewSonic 17



Finalist
ViewSonic 17

CIRCLE 118 ON READER SERVICE CARD

Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

Kermit's Kindergarten Computer Classes

BY CHARLES TAFT

"It's not easy being green," according to Kermit the Frog, and it's not easy explaining to young children how computers work, either. Many parents struggle with homebrewed explanations such as "The hard disk is like a pizza; the anchovies are over here, and—er—somehow the computer knows where to go to find them."

Prima Publishing and Jim Henson Productions have teamed up to produce two Muppet computer books: *Kermit Learns How Computers Work* and *Kermit Learns Windows*. The books employ Kermit, Miss Piggy, and the rest of the Muppets to introduce children (ages five and up) to computer basics. Specifically designed for kids, both books contain numerous colorful illustrations and feature hard covers, heavyweight pages, and simple sentences.

In *Kermit Learns How Computers Work*, children are given high-level overviews of the main parts of a computer system (CPU, RAM, hard disk, and so on) with explanations of how these parts work together to transform your thoughts into finished products. Key words (such as *memory* and *output*) are explained in very basic terms, and numerous graphics give young readers a clear understanding of the subjects (the walk-through-the-computer illustrations are particularly helpful).

Kermit Learns Windows introduces children to the basic



features of the Windows environment. Concentrating mainly on the Paintbrush application, the book shows children how to use the program's tools to create a birthday card, complete with a do-it-yourself cake graphic and text message. The book does a very good job of explaining terminology (such as

group and application icons) with clear descriptions, although some computer-knowledgeable parents might find some of the definitions or statements too simplistic (for example, "The Accessories group icon holds things that make your computer fun").

Both books are probably best used with children closest to the minimum recommended age of five. Using Kermit and his Muppet buddies to explain how computers work is a great concept for five-year-olds, but I suspect there



may be some problems in getting "grown-up" eight-year-old kids to identify with Sesame Street characters long enough to assimilate the material.

► **Kermit Learns How Computers**

Work, by Margy Kuntz, \$9.95; Prima Publishing, 800-255-8989; ISBN: 1-55958-367-3.

Circle 463 on reader service card

► **Kermit Learns Windows**, by Kathleen Resnick, \$9.95; Prima Publishing, 800-255-8989; ISBN: 1-55958-366-5.

Circle 464 on reader service card

Learning to Use a Programmer's Gem

BY BARRY SIMON

Microsoft's Multimedia Viewer is not a sufficiently well-known gem. Like the Windows' Help engine, Viewer can be used even by nonprogrammers to produce impressive applications. Unlike the Help engine, Viewer has built-in full-text search and special support for multimedia files.

Microsoft's Viewer Publishing Development Kit (PDK) contains a basic compiler and tools to produce the necessary source files for the compiler. Unfortunately, the PDK's documentation is terse, and its tools are less than ideal. Stephen

Pruitt's *Microsoft Multimedia Viewer How-To CD*, however, will supplement the Microsoft package and help anyone master the development kit. The book comes with a CD that includes a trial copy of Viewer (limited to 25 topics), so it can be an ideal vehicle for deciding if you want to purchase the full PDK.

Each section begins with a title such as "How do I Use Multiple Hot Spots in One Picture." That is followed by an expanded statement of the problem, a summa-

ry of the solution, a step-by-step explanation of exactly the steps needed, an explanation of why the solution works, and some additional comments. The chapters end with a Tips and

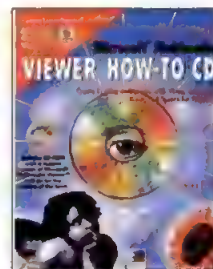
Techniques section that is pure gold.

The first chapters start out with the basics, but the book goes on to deal with advanced topics such as the use of sound, animation, or movies.

Microsoft has announced that the Chicago Help engine will have most of Viewer's capabilities built in. So coming up to speed with Viewer has become important for many programmers and others developing tutorial or reference works. It is hard to imagine a better vehicle for doing this than Pruitt's book.

► **Microsoft Multimedia Viewer How-To CD**, by Stephen Pruitt, \$39.95; The Waite Group, 800-368-9369; ISBN: 1-878739-60-3.

Circle 465 on reader service card



Read Only Recommends

Most people trying to get their feet wet in networking wind up drowning in all its acronyms. Gary Scott Malkin's *Comprehensive Networking Glossary and Acronym Guide* is a complete collection of technical terminology that should help you stay oriented in the ever-widening

world of networking. \$29.00; Manning Publications Co., 203-629-2028; ISBN: 1-884777-02-3.



RACK MOUNTED PROLIANT SERVERS

THOUSANDS OF COMPANIES DEPEND ON MICROSOFT TO RUN THEIR BUSINESSES. DID YOU EVER WONDER WHO MICROSOFT DEPENDS ON TO RUN THEIRS?

As one of the largest developers of software in the world, with hundreds of thousands of customers around the globe, there's just one thing about Microsoft that people sometimes overlook: That they've got a business to run too.

A business with people who need constant (and instant) access to crucial information—like customer service records and problem/solution databases. And a Microsoft® Windows NT™ Server network that not only serves their headquarters near Seattle but all of their offices around the world. So they need to have server systems they can count on.

Which is why they rely on Compaq.

Because Compaq provides reliable servers that keep running. Servers that allow you to configure

Microsoft Windows NT Server simply and easily with one CD. And Compaq has servers that come with Insight Manager, which is a specially designed Compaq technology that manages over 800 key server elements and warns you about potential problems. Before they become real ones.

And because they're Compaq servers, each one is backed by our three-year on-site warranty* and our 7 day a week, 24-hour technical support line.

So if you're looking for a powerful and reliable system to help you run your business, give us a call at 1-800-664-9888. But do yourself a favor, don't just take our word for it. Ask around.

The Compaq logo, featuring the word "COMPAQ" in a bold, italicized, red sans-serif font with a slight 3D effect.© 1994 Compaq Computer Corporation. All Rights Reserved. Compaq Registered U.S. Patent and Trademark Office. Microsoft is a registered trademark of the Microsoft Corporation. Windows NT is a trademark of the Microsoft Corporation. Insight Manager is a registered trademark and ProLiant is a trademark of Compaq Computer Corporation. *Limited warranty. Certain restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. For details, call the Compaq Customer Support Center at 1-800-345-1518.

management wants you
to be MORE PRODUCTIVE.

you don't WANT
TO CHANGE THE way you WORK.

WE HAVE A new release of
1-2-3 FOR DOS.

THIS COULD work
out nicely.

NEW RELEASE. NEW
CAPABILITIES. SAME
GREAT FEELING.

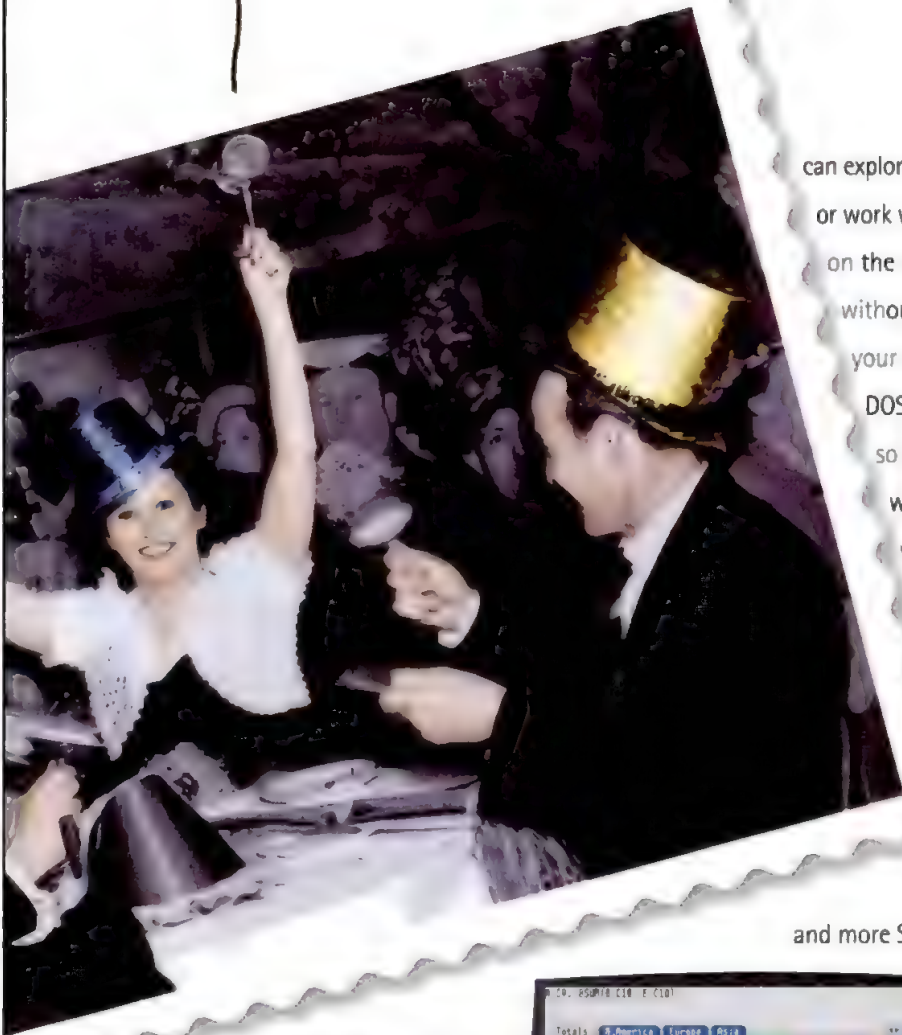
The new 1-2-3® R4 for DOS has the
productivity and ease-of-use features
you've been asking for, without losing the



comfortable feeling of
the 1-2-3 you know and
love. It does this without
the expense of upgrading hardware or
the time of retraining. And it's 100%
compatible with all past 1-2-3 versions.

1-2-3 R4 for DOS incorporates user suggestions like
Column Fit-Widest, a feature that automates column
formatting to accommodate the biggest entry; a built-in





can explore all kinds of scenarios, or work with all kinds of people on the same spreadsheet, without ever losing track of your thinking. 1-2-3 for DOS is also mail-enabled, so it's easy to share your work with anyone on your network.

As for ease of use, you get many

of the graphical interface features that make our Windows™ products so popular – like a Live Status Bar for easy access to fonts, styles and other settings; Worksheet Tabs that make navigating between spreadsheets easy; and more SmartIcons® than ever, for one click access to the

the SAME 1-2-3 with great NEW FEATURES:

- COLUMN FIT-WIDEST
- SPELL CHECKER
- AUTO BACKUP
- IMPROVED HELP AND INTERACTIVE TUTORIAL
- CCMAIL-ENABLED
- CELL NOTEPAD

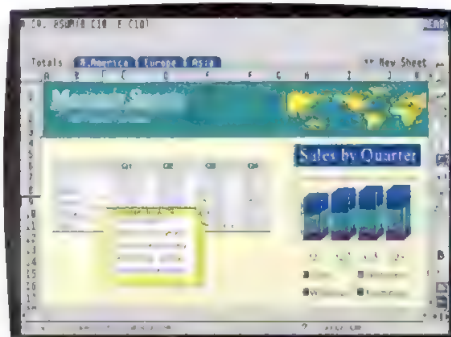
most crucial features.

You can get all this without changing the way you work and most likely without upgrading your current hardware. Best of all, you can get it for just \$119*. Just call us at 1-800-TRADE-UP, ext. A189** for more information. And ask your Lotus

spell checker; and a Cell Notepad that lets you attach a note to any cell on your spreadsheet.

IT WORKS BETTER AND IT WORKS EASIER.

And the new 1-2-3 for DOS includes the exclusive Lotus® Version Manager™ technology which allows you to keep track of different versions of data in a single file. This means that you



The new 1-2-3 for DOS has Worksheet Tabs, a Cell Notepad, a Live Status Bar for easy access to settings and lots of SmartIcons.

Authorized

Reseller about volume purchase options through Lotus Passport.†

Lotus
Working Together™

*If you are considering a move to Windows, our 1-2-3 Release 5 for Windows will have you up and running in no time.
†If you are considering a move to Windows, our 1-2-3 Release 5 for Windows will have you up and running in no time.
are registered trademarks and Version Manager is a trademark of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation.

Test Drive the Future

Introducing the behind-the-scenes story of Microsoft's next-generation operating system.

Industry veteran Adrian King penetrates deep into the development process to bring this extraordinary story to life.

An Insider's Perspective

You'll live and breathe software with Microsoft's crack Windows™ "Chicago" development team. Get in on ground-floor discussions of the philosophy, design, and architecture. And be one of the first to explore and evaluate the major components of the Microsoft® Windows 95

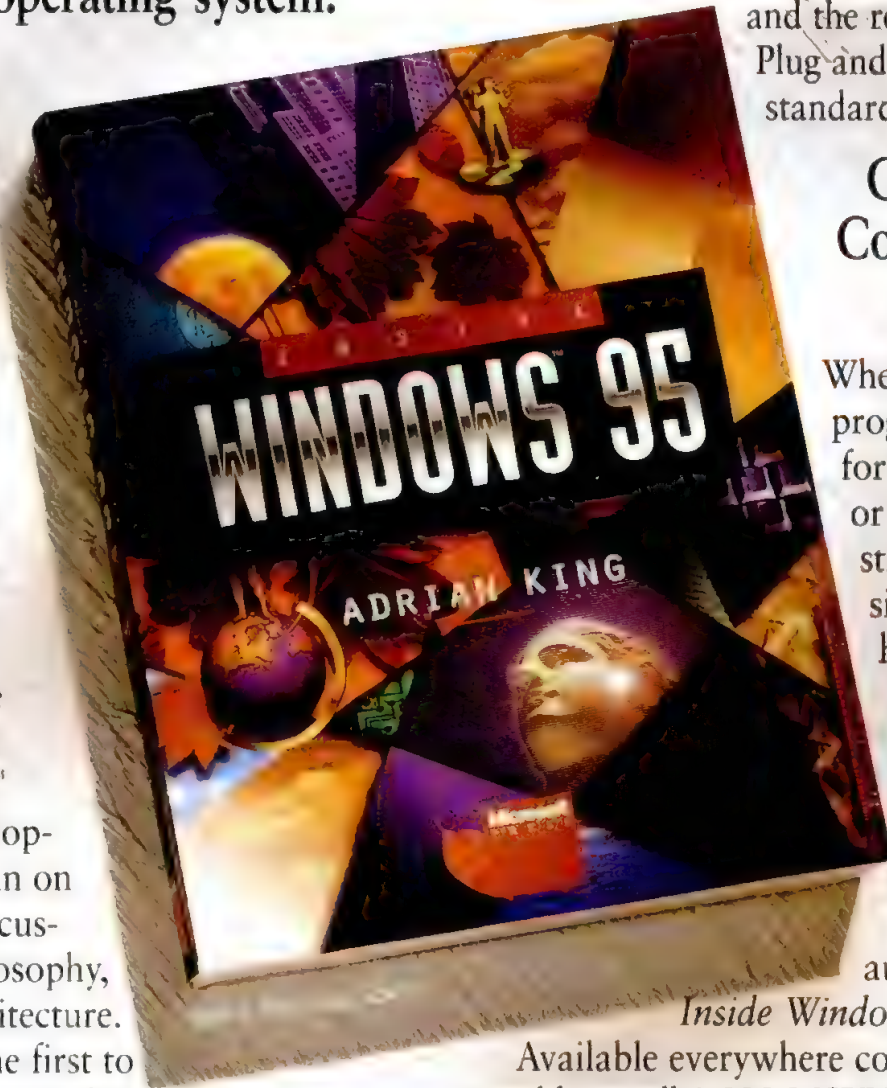
operating system—the 32-bit protected mode base system, the all-new user interface, the Win32® API implementation in Windows 95, and the revolutionary Plug and Play standard.

Gain the Competitive Edge

Whether you're programming for Windows 95 or faced with strategic decisions about how to proceed into the future of personal computing, ask for the ultimate inside authority—

Inside Windows 95.

Available everywhere computer books are sold, or call 1-800-MSPRESS. Refer to ad APM.



Microsoft Press®

The Knowledge Division of Microsoft

One Microsoft Way, Redmond, WA 98052-6399. In Canada, call Macmillan Canada, 1-800-667-1115.

Microsoft and Win32 are registered trademarks and Windows is a trademark of Microsoft Corporation.

Barnes & Noble
Booksellers Since 1873

Waldenbooks

**SOFTWARE
SPECTRUM**

**SOFTWARE
ETC.**

If you paid full price, you didn't buy it at
CROWN BOOKS



Michael J. Miller

Checking into Suites

Like it or not, software suites—bundles of applications designed to be used and sold together—are here to stay. The three primary contenders in the suite market, Microsoft Office 4.2c, Lotus SmartSuite 3.0 for Windows, and WordPerfect Perfect-

Office 3.0 are certainly large and capable packages (see “Are They Suites Yet?”). Yet I’ve been struck not only by how far these products have come toward integrating individual applications, but also by how far they still have to go.

SHARE AND SHARE ALIKE

We’re just starting to see applications share common functions, such as spell-checkers and File Open dialog boxes. I’d like to see this extended much further—to include such things as common formatting styles and drawing tools. Despite the promise of reusable code, each of the suites has multiple drawing tools that work very differently from one application to another. I do understand that word processing, spreadsheet, and graphics programs have particular drawing needs, but the drawing tools could at least be more consistent.

Similarly, I still feel like I have more text editors than I want. If the suites come with these great word processors, how come I have to drop back to a weaker cousin when I’m in my e-mail package?

Farther down the road—but not much farther—I’d like to be able to create a macro or even a customized program that uses the applications’ individual components as building blocks. After all, that’s the goal of compound documents and all this sophisticated object technology. Unfortunately, a few things prevent this from becoming a reality.

To begin with, making macros work across applications is a real challenge. In part, that’s because the macro languages of word processors have historically been so different. Getting these two core components hooked up to the graphics program and the database using the same macro language is tough; it’ll probably

take several more versions before any of these packages succeed.

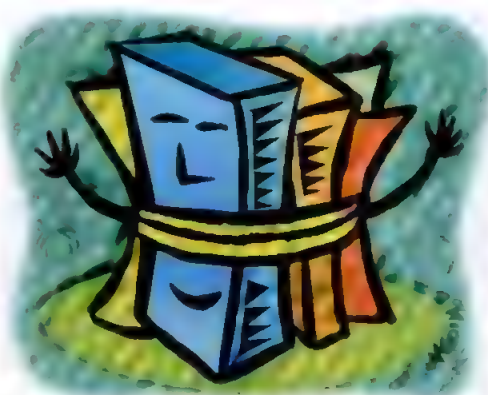
Some of the most interesting work in this field has come from WordPerfect. With PerfectOffice 3.0, Novell’s Application Group is offering PerfectScript, a cross-application macro language that includes a macro recorder. The Professional version adds Visual App-Builder, a visual tool for combining the applications into a customized project. These tools, however, could be more tightly integrated with the applications in the suite. Meanwhile, we’re still waiting for Microsoft Visual Basic, Applications Edition, to be extended beyond Excel and Project. And Lotus’s LotusScript remains under wraps, at least for the time being.

APP BLENDERS

The next step necessary for application integration to work well is to have the applications built of smaller components that can be more easily mixed and matched. Microsoft’s Object Linking and Embedding (OLE) is fine as far as it goes—but it is inefficient, requiring you to load an entire spreadsheet when all you may want is a table editor with some basic calculation features.

The reason we’re seeing bigger “large-grain components” (as opposed to smaller objects) implemented in both OLE and Appware Loadable Modules in PerfectOffice is clear: This is what vendors are used to building. Backers of OpenDoc technology say their standard is better suited than OLE for building applications from smaller components; Microsoft says this is complete hogwash and points to the lack of any OpenDoc applications.

OpenDoc may have some answers. It would be



The key to suite success is the continuing development of application integration.

Michael J. Miller

nice to have multiple objects active at the same time, instead of the one large object that OLE allows. That way, you could have an active query of a database or an active news feed within an application that was doing something else. On the other hand, OLE applications exist today; OpenDoc-based applications are just a theory, and nothing says OLE won't evolve over a period of time.

WORKGROUP WONDERS

All of the suite makers share a common goal: To let people work together using common applications that can run simultaneously in a similar desktop environment. The problem is that today's workgroup solutions fall far short of meeting this goal.

We're seeing just the beginnings of true workgroup integration. Nearly all of the suites let you send mail from within any application. With many, you can now route messages to a group of people, either sequentially or simultaneously. Such inte-

gration with e-mail software is admirable, but it only scratches the surface.

I'd like to be able to see—from within an application—whether the people I've routed a message to have received it or replied to it. And I'd really like to use the full-featured word processors that come with the suites as my e-mail editor for sending, reading, and replying to e-mail.

The next step is integration with mail software, databases, and workgroup platforms such as Lotus Notes to create a repository of information. That way, users could store commonly-accessed documents, spreadsheets, or presentations in a single place. Any user could check them out, get copies, and modify them. You'd also be able to track who has a document and how it has changed over time.

We're seeing the beginnings of this in the Notes/FX integration offered by the Lotus applications and, to a lesser extent, in the latest versions of Word and Excel in the Microsoft suite. But let's be clear—Notes/FX isn't yet a tool for real end users. Even Lotus's Notes support staff laughs at the idea of end users trying to integrate on their own; they say (rightly so) that it's a task for developers. One day, though, we'll set up group

applications that are completely integrated with mail software, databases, and workgroup platforms as easily as we create spreadsheets today.

You're probably reading this and wondering just how large these suites will have to get in order to achieve true application integration. If they have object technology and reusable, common code, I don't think they need to get much larger. They may even shrink. What will take up a lot of hard disk space are sample files and multimedia help features that will undoubtedly continue to grow.

Even today, a full installation of any of the suites can easily take between 80MB to 170MB of hard disk space. And having multiple applications running, even if they are smaller objects, is going to take more memory. My guess is that if you really want to run the suite of the future (in, say, 1996), you're going to want a minimum of 16MB of RAM—maybe even 32MB.

But that's to be expected. Hardware keeps improving, and software keeps using it all up. We've come a long way from the days when Lotus 1-2-3 was considered "integrated software," but we still have a long way to go. □

The advertisement features a large, stylized graphic with the text "the Sensible choice" in a serif font. Below the text, there is a collage of images including a hand holding a pen, a green eye-like shape, a blue ear-like shape, and a purple abstract shape. The QuickShot logo is visible in the bottom left corner of the graphic. Below the graphic, there is a row of images showing various electronic products: a mouse, a pen drive, two small speakers, a large printer/scanner, two more speakers, and a circuit board. At the bottom, the QuickShot logo is repeated, followed by the company name and address: "QuickShot Technology Inc. 47473 Seabridge Drive, Fremont, CA 94538". To the right of the address are the phone and fax numbers: "Tel: 510-490-7968 Fax: 510-490-8370".

the Sensible choice

QuickShot

QuickShot Technology Inc. 47473 Seabridge Drive, Fremont, CA 94538 • Tel: 510-490-7968 Fax: 510-490-8370

Value
means more
computer for
your money...

Great features, performance and reliability...



which is why so many PCs worldwide...

Are really Acer's underneath.



and why so many smart buyers choose Acer.



The Industry Source
Means Value.

90 MHz Power. 100% Value.



ACER BRINGS 90MHZ PENTIUM™ PROCESSOR SYSTEMS TO MARKET

pentium

There are a number of reasons why power-hungry computing professionals are checking out the AcerPower 90MHz workstations. The first is the blazing 90MHz Pentium processor in each one. Pentium represents the most processing power you can get your hands on today. And these AcerPowers make short work of even the most computation-intensive tasks.

PICK YOUR PRICE-POINT

Reason number two: a broad line to choose from. You can enter the Pentium processor world for as low as \$2,595 and still not compromise on RAM (8MB), hard drive capacity (730MB) or performance (a 64-bit 1MB Windows

Join The Revolution With The AcerPower 90MHz Pentium Processor System

The AcerPower™ Pentium processor workstation represents the next technological leap forward by combining unparalleled 90MHz Pentium-based processing with the high-speed PCI local bus,



for the ultimate in power and speed.

The fast throughput of this system gives you the high-performance needed for the future with true-color, full-motion video and 3-D graphics. And PCI also allows automatic configuration of new peripherals as you install them into your system.

- Intel® Pentium/90MHz Processor
- 8MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 730MB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Panasonic™ 2X CD-ROM Drive
- 15" .28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2MB 64-Bit PCI Nitro Windows Accelerator Card
- 1.44MB Diskette Drive
- 2 PCI 64-Bit Expansion Slots
- 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Slot
- 16-Bit Sound Blaster-Compatible Sound Card
- Microsoft® Windows™ for Workgroups, MS-DOS® 6.2, Productivity/Entertainment Packs, Works for Windows™, Quicken™ and Multimedia Software Bundle Included

\$2,795

\$103 A Month Business Lease

accelerator is standard). Or, graduate to a deluxe AcerPower with dual 1GB hard disk drives, multimedia hardware and software. Or choose from one of five models in between.

Or order a model custom-configured to your specifications. But no matter which way you go with AcerPower Pentium processor systems, you're getting 100% value for your dollar—and the ultimate computing power for your desktop.



AcerPower Pentium/90MHz



- Intel Pentium/90MHz Processor
- 8MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 730MB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 15" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 1MB 64-Bit PCI Nitro Windows Accelerator Card
- 2 PCI Expansion Slots
- 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$2,595

\$95 A Month Business Lease

The New Value Leader

AcerPower Pentium/90MHz



- Intel Pentium/90MHz Processor
- 16MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 810MB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 15" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2MB 64-Bit PCI Nitro Windows Accelerator Card
- 2 PCI Expansion Slots
- 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$2,995

\$110 A Month Business Lease

Screaming Pentium Processing Power

RELY ON THE STRENGTH OF A \$1.9 BILLION GIANT

Since our start in 1976, Acer has grown to be the vendor of choice for the world's top computer companies.

Features	Acer	Gateway
Manufacturer of most system component parts	yes	
24 Hour Notebook Replacement Warranty	yes	
International Travelers Warranty	yes	
CD ROM in every System	yes	
Free On Site Service With Every Desktop System	yes	yes
10 years in the PC Business	yes	
ISO-9002 quality certified	yes	
24-Hr. Toll Free Tech Support	yes	yes

MULTIMEDIA UPGRADE KIT

Make the most of the new Acer CD-ROM standard with this special multimedia upgrade kit that includes: Sound Blaster and Business Audio-compatible 16-bit sound card; high-performance stereo speakers; Microsoft multimedia bundle with Works, Encarta™, Golf, Cinemania™ and SoundBits™.

A FULL YEAR OF ON-SITE SERVICE

Don't worry. If you have a problem with your Acer desktop system, we'll have a skilled service representative out to you in 48 hours—we promise.



Only **\$150**
Available with system purchase only.

Cards Welcome



Call 800-848-ACER

When calling, please reference #104 ACD

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time

ACERPOWER PENTIUM/90MHZ A MULTI-TASKING MONSTER

- Intel Pentium/90MHz Processor
- 16MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 810MB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 2MB 64-Bit PCI ATI Mach 64 Windows Accelerator Card
- 17" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2 PCI Expansion Slots, 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$3,495

\$128 A Month Business Lease

ACERPOWER PENTIUM/90MHZ A GRAPHICS POWERHOUSE

- Intel Pentium/90MHz Processor
- 16MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 1GB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 4MB 64-Bit PCI ATI Mach 64 Windows Accelerator Card
- 17" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2 PCI Expansion Slots, 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$3,795

\$138 A Month Business Lease

ACERPOWER PENTIUM/90MHZ THE POWER AND THE STORAGE

- Intel Pentium/90MHz Processor
- 32MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 1GB PCI SCSI Fast Hard Disk Drive
- Adaptec PCI SCSI Controller
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 2MB 64-Bit PCI ATI Mach 64 Windows Accelerator Card
- 17" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2 PCI Expansion Slots, 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$4,495

\$165 A Month Business Lease

ACERPOWER PENTIUM/90MHZ THE ULTIMATE POWER PACKAGE

- Intel Pentium/90MHz Processor
- 64MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 2-1GB PCI SCSI Fast Hard Disk Drives
- Adaptec PCI SCSI Controller
- Panasonic 2X CD-ROM Drive
- 1.44MB Diskette Drive
- 2MB 64-Bit PCI ATI Mach 64 Windows Accelerator Card
- 15" 28mm Non-Interlaced Flat Screen Digital SVGA Color Monitor
- 2 PCI Expansion Slots, 4 ISA 16-Bit Expansion Slots
- 1 Combination PCI/ISA Expansion Slot
- Microsoft Windows for Workgroups, MS-DOS 6.2, Productivity/Entertainment Packs, Works for Windows, and Quicken Installed

\$5,995

\$219 A Month Business Lease

Acer

Great AcerNote pricing means you can snap up a superior notebook.



DESKTOP POWER TO GO

Now you can have twice the power of a desktop system in your notebook computer. With the lightning-fast IntelDX4™ processor running at 75MHz, your productivity will reach new heights. After all, if you're busy enough to need a notebook, you sure don't have time to sit and watch the hourglass.

MODULARITY FOR YOUR NOTEBOOK

Convenient, upgradable architecture has arrived with the AcerNote 780cx. It features a revolutionary modular design that makes upgrading components and servicing easy. That's



important, because when you're traveling with your notebook, your system administrator won't be around to help you.

ADD NEW FEATURES AS THEY ARE ANNOUNCED

As higher capacity hard drives become available, you can plug them in yourself with the easy-to-open Acer SmartCase™. And look forward to being able to grow into the latest and greatest features as they are announced.

PCMCIA GIVES YOU EASY COMMUNICATION

You can simply slide in a credit card-sized PCMCIA card that lets

you tap into your network, send information to a fax machine via modem, access additional storage devices or plug in more memory. And once you return to the office, you can easily transfer your new data to your desktop.

COUNT ON DEPENDABILITY WITH THE INDUSTRY SOURCE, ACER

Many of the leading notebooks are manufactured by Acer—now you can have the confidence that comes from using the industry source.

AcerNote 780cx IntelDX4/75MHz

- IntelDX4/75MHz processor with built-in 16KB cache and coprocessor
- 8MB system RAM
- SmartCase™ easy-to-open modular housing for easy upgrades and serviceability
- Easily upgradable 340MB 2.5" hard drive
- Easy-to-remove keyboard for quick memory and BIOS upgrade
- EasyTrac™ centrally located removable trackball
- 2 PCMCIA Type II Slots/1 Type III Slot
- 1.44MB diskette drive
- Local bus accelerated graphics
- Suspend-to-Disk feature, "No-Reboot" CMOS setup and Suspend-Resume hot button preserve battery life
- 9.5" active-matrix LCD displays 256 colors
- Simultaneous LCD/CRT display
- Slim 8.66" x 11.4" x 2.1" case weighs 6.4 lbs, including NiMH battery pack
- Graphic battery gauge indicates remaining battery life
- One year 24-hour "Hot Swap" warranty in the U.S. and Canada



\$3,995

\$132 A Month Business Lease

NEW



The Industry Source means value.

EXPANDABILITY FOR TOMORROW, POWER FOR TODAY

The AcerNote 760 series gives you all the expandability of the 780cx, plus more power than many current desktop PCs. The high performance of the Intel486™DX2/50MHz processor, combined with local bus architecture, gives you the power to take all your projects on the road with you, not just the less demanding ones.



ACERNOTE GIVES YOU EASY UPGRADES!

You also get the same convenient, upgradable architecture in the AcerNote 760 series as in the higher-priced 780cx. A revolutionary modular design makes upgrading components and servicing easy. If you're on the road when you need more storage or memory, you can simply plug in off-the-shelf components yourself.

SUSPEND/RESUME HOT BUTTON SAVES YOU TIME!

The AcerNote 760 series offers time-saving benefits for the traveler, including the ability for you to jump right back into

your applications from where you left off. By using a "hot button" you can close down and re-enter your work instantly, without having to wait for the usual boot-up procedure. This power-saving feature assures a 3-5 hour battery life.

ASSISTANCE AROUND THE GLOBE

Because the most powerful notebook does you no good if it's not working when you need it, the AcerNote series is backed by a one-year, 24-hour replacement warranty in the U.S. and Canada. To assure you support in over 20 countries worldwide, a free one-year Acer International Travelers Warranty is also included.



30-DAY MONEY-BACK GUARANTEE

We are so sure that you'll be totally satisfied with your new Acer system that we're offering a full 30-day money-back guarantee—no questions asked.



AcerNote 760c i486DX2/50MHz

- i486DX2/50MHz processor with built-in 8KB cache
- 4MB system RAM
- SmartCase easy-to-open modular housing for upgradability and serviceability
- Easily upgradable 340MB 2.5" hard drive
- Easy-to-remove keyboard for quick memory and BIOS upgrade
- EasyTrac centrally located removable trackball
- 2 PCMCIA Type II Slots/ 1 Type III Slot
- 1.44MB diskette drive
- Local bus accelerated graphics
- Suspend-to-Disk feature, "No-Reboot" CMOS setup and Suspend-Resume hot button preserve battery life
- 9.5" dual-scan LCD
- Simultaneous LCD/CRT display



- Slim 8.66" x 11.4" x 1.8" case weighs 6.4 lbs, including NiMH
- Graphic battery gauge indicates remaining battery life
- One year 24-hour "Hot Swap" warranty in the U.S. and Canada

\$2,395

\$88 A Month Business Lease



Cards
Welcome



Call 800-848-ACER

When calling,
please reference #104 ACD

CIRCLE 034 ON READER SERVICE CARD

Monday through Friday 6 AM - 6 PM and Saturday 8 AM - 4 PM Pacific Time

World class service with assistance around the globe.

AcerNote 760cx i486DX2/50MHz THE PRESENTATION PERFORMER

- i486DX2/50MHz Processor with Built-In 8KB Cache
- 4MB System RAM
- 2 PCMCIA Type II Slots/ 1 Type III Slot
- 9.5" Active-Matrix LCD Displays 256 Colors
- 340MB 2.5" Hard Disk Drive
- Palmrest with Integrated Trackball
- 1.44MB Diskette Drive
- Local Bus Accelerated Graphics
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty in the U.S. and Canada

\$3,395

\$124 A Month Business Lease

AcerNote 735c 486SX/33MHz THE VALUE WINNER FOR PRESENTATIONS

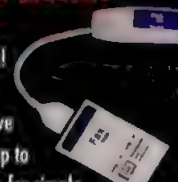
- Intel SL-Enhanced 486SX/33MHz Processor
- 4MB System RAM
- 2 PCMCIA Type II Slots/ 1 Type III Slot
- 9.5" Dual-Scan LCD Color Display
- 209MB 2.5" Hard Disk Drive
- Palmrest with Integrated Trackball
- 1.44MB Diskette Drive
- Local Bus Accelerated Graphics
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty in the U.S. and Canada

\$1,995

\$73 A Month Business Lease

PCMCIA FAX/DATA MODEMS AND LAN CARDS

Your office at your fingertips! A removable PCMCIA card allows you to send and receive faxes and data at a rate of up to 14.4 baud, with fax software for simple, error-free operation. LAN cards, with your option of either twisted-pair or coaxial cable, get you into your office network with ease.



SPARE BATTERY

NiMH BATTERY PACK NiCad BATTERY PACK
\$169 \$99

ADDITIONAL MEMORY

AcerNote Series—4MB
Memory Upgrade

\$269

AcerNote Series—8MB
Memory Upgrade

\$699



Acer



EXPLORE the INTERNET!

FREE



DELPHI is the only major online service to offer you full access to the Internet. And now you can explore this incredible resource with no risk. You get 5 hours of evening/weekend access to try it out for free!

Use DELPHI's Internet mail gateway to exchange messages with over 30 million people at universities, companies, and other online services such as CompuServe and MCI Mail. Download programs and files using **FTP** or connect in real-time to other networks using **Telnet**. You can also meet people on the Internet. **Internet Relay Chat** lets you "talk" with people all over the world and **Usenet News** is the world's largest bulletin board with over 20,000 topics!

now supporting
**9,600
and
14,400
bps**
at no extra charge!

To help you find the information you want, you'll have access to powerful search utilities such as "Gopher," "Hytelnet" and "WAIS." If you aren't familiar with these terms, don't worry; DELPHI has hundreds of expert online assistants and a large collection of help files, books, programs, and other resources to help get you started.

Over 850 local access numbers are available across the country. Explore DELPHI and the Internet today. You'll be amazed by what you discover.

FIVE HOUR FREE TRIAL!

Dial By Modem 1-800-365-4636, Press return until you get a prompt
At Username, enter JOINDELPHI. At Password, Enter PCMC94B

Offer applies for new members only. A valid credit card is required for immediate access.
Other restrictions apply. Complete details are provided during the toll-free registration.

Attention Current Internet Users: See what DELPHI can offer you! Stock quotes, Grolier's Encyclopedia, newswires, and hundreds of other services are just a few keystrokes away. Telnet to delphi.com and enter the username and password above for a free trial.

*9,600 bps available in most local areas via Tymnet and Sprintnet. 14,400 bps available by dialing direct to Cambridge, MA.

DELPHI

INTERNET

Questions? Call 1-800-695-4005.
Send e-mail to INFO@delphi.com



Bill Machrone

Needed: A Fee-Based Internet

We need a fee-based Internet, and we need it now. Put down that pistol, and hear me out. I'm not proposing that we do anything to change the existing Internet in any way. In fact, the network I'm proposing will get resource- and bandwidth-

wasting bozos like me off the net and free up precious access for the people the Internet was built for: academics and researchers. I'd pay extra for value added above and beyond today's Internet.

Existing Internet service providers don't give me the access I want, and they don't provide the service I need. At the same time, the sheer number of on-line services is burgeoning, and many aren't on the Internet. For example, Comcast has announced a plan to put local city guides into 350,000 hotel rooms, via the TV set. Sounds great, huh? Trouble is, you pay for it, and you probably pay through the nose. Telephone and video services are great profit-makers for the hotel industry. Not that I begrudge that, but once in the room you're a captive audience.

If I just happen to be in a progressive town such as Palo Alto or San Carlos, California, I have an alternative. I can dial up everything from restaurant recommendations to guides to city services, even local rail and bus schedules. I have a choice of information sources, and choice is what our economy's all about. Rather than see a partial list of restaurants probably paying to be listed, I can instead get the local populace's opinion of what's good and what's not—even favorite dishes.

A nationwide city-guide service like that won't just happen spontaneously, as so many of the good things on the net have. It'll take a well-organized company with some vision to go into, say, every town with more than 500 hotel rooms and get the data collection seeds started. They'll have to get the database loaded onto existing servers or establish new servers where needed. Local chambers of commerce might gladly put up some or all of the money, but not one in a

hundred has the required expertise to do it. I'd pay to use the resulting system. As long as the information is better—and cheaper—than the canned system on the TV set, it'll be a success.

Companies who provide access to the Internet typically pay a flat fee for a high-speed (T-1 or greater) connection. Then they charge you and me for pieces of the bandwidth. Even though the Internet is global, service tends to be local. Let me give you an idea of what I'm talking about, then judge for yourself.

Machrone's formula for a commercial Internet:

1. Have a single billing point. I want one itemized bill for the sites I use and the time I spend using them. I use many long-distance services, whether I like it or not ("Thank you for using GougeComm"), but I only get one bill. See below.

2. Allow premium services. I'm not opposed to paying for more when I get more. Some services that should be on the Internet aren't, but they would be if they could recover the costs.

3. Use 800 numbers. For travelers, MCI Mail is the ultimate convenience. The only thing you ever have to think about is whether you need to dial 9 for an outside

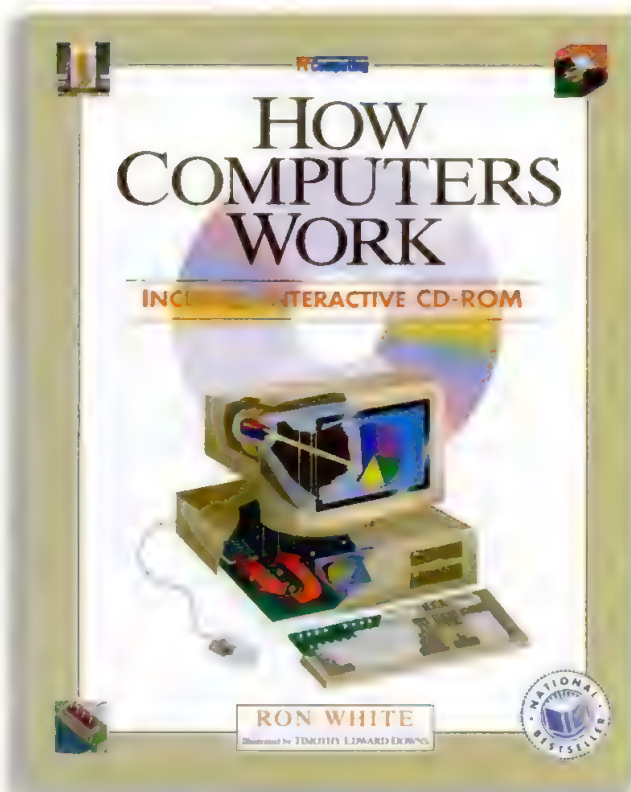
line. Services like CompuServe, on the other hand, require you to call to find out your local access number. Yes, you can use an 800 number to get to CompuServe, but they sock you with a supplemental charge.

4. Tailor the tools to dial-up line speeds. I use Mosaic to access World-Wide Web servers on the Internet at work, but I get to the net over a 57-kilobit line. Some of Mosaic's most satisfied users have much faster access. That satisfaction falls inversely with the line speed. By the time you get down to 9.6 or 14.4 Kbps, you're slogging. The



If the Internet is to grow, it's going to need a cash incentive. Here's my seven-point formula.

Click Click,



ISBN 1-56276-250-8 Price: \$39.95

**PC/Computing How Computers Work
CD-ROM/Book extravaganza from Ziff-Davis Press.**

WHIZ



Click your way through an electrifying multimedia voyage to the heart of the computer with *How Multimedia Computers Work*—a unique CD-ROM packaged with the classic best-selling book *PC/Computing How Computers Work*.

In *How Multimedia Computers Work*, fun, fast-paced, fascinating tours of your computer's incredible



innards combine state-of-the-art 3D animation with lively dialog and music for a richly interactive sensory feast. Also included are provocative video interviews with well-known computer industry figures—plus tons of computing tips from the top authors at Ziff-Davis Press. Teamed up with a book that has already shown legions of computer users what makes their machine tick, *How Multimedia Computers Work* is a real whiz-bang experience that's sure to make you see your computer in a whole new light.

Ask your favorite bookseller for *PC/Computing How Computers Work* with *How Multimedia Computers Work* on interactive CD-ROM.

BANG

**Ziff-Davis Press books are available at all fine bookstores,
or call 1-800-688-0448, ext. 223.**



© 1994 Ziff Davis Press

Bill Machrone

ideal tool is still graphical, but that should adjust automatically to available bandwidth by choosing not to download some graphics, storing commonly used ones locally, and asking me how much glitz I want before it automatically goes off building pretty menus.

5. Provide multiple views. Part of what I'm willing to pay for is sophisticated access tools. I have no idea, for instance, which towns I visit have local information servers and which don't. How about a geographic representation with available servers indicated in bright dots, while the area they cover is shaded? (Throw in a GPS receiver card, and you can even do a "you are here.") I'm not always after closeness and convenience, however. Let's say that I need to entertain a client who is passionate about Japanese food. In an ideal world, I could telnet to the restaurant's server, peruse the menu, and make a reservation.

6. Keep the prices low, but give me a fuel gauge. One of the things I really like about using Ziff-Davis's on-line magazine databases (Magazine Database and Computer Database) is that I can find out how much a given query is going to cost before I make it.

7. If you must deliver it piecemeal, give me a schedule. Rome wasn't built in a day; apparently, the kinds of on-line services I'm looking for won't be, either. I sure don't mind using services that are under construction, but I'd like realistic delivery dates, not empty promises.

FLAME MAIL

A final note: Some denizens of the Internet have the less-than-charming habit of sending flame mail to anyone whose opinion they disagree with, especially if they perceive that it in some way threatens their electronic fiefdom. Flames were once strongly held opinions in heated arguments. Today, they tend to be obscene, intimidating, threatening, racist, sexist—meant to scare away all but the most intrepid. Imagine walking into a bar in an unfamiliar neighborhood. As you step inside, everyone starts screaming and swearing at you. A few pick up bottles and pool cues. Welcome to the new world of flammers.

Having rendered an opinion, I expect some opinions in return. I've stepped into the bar; I hope we can discuss things over a beer. □

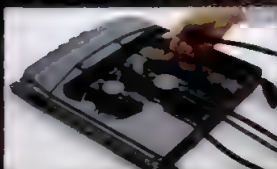
"Have you looked under your desk recently?"

Steve Bass, PC WORLD
"Hot Picks for the Home
Computer" article, June 1994



Introducing PowerManager™ with cord management capabilities!

Chances are, you've got a jungle of power cords under your desk that need to be tamed. As PC WORLD says, "...it's time you rounded up that mass of coils with [APC's] PowerManager™. Just slide back



the cover, and you've got a place to safely and neatly store equipment power cords. PowerManager also has a customizable front panel that you can tailor to your own system configuration and a convenience outlet for charging of laptops or other desktop needs.

With a single touch, you can power-up as many as five peripherals in your multimedia or similar system, right from your desktop. PowerManager also offers the highest level of surge protection. We guarantee it! Under APC's Lifetime Equipment Protection policy, we'll repair or replace up to \$25,000 worth of properly connected equipment if it's ever damaged by a spike, surge or lightning strike. And, with its lifetime product warranty, PowerManager will be the last control center you'll ever have to buy!



So, take control! Call APC toll-free for more information at (800)800-4APC, or call our literature PowerFax system to have a spec sheet automatically sent right back to you: (800)347-FAXX.

APC

AMERICAN POWER CONVERSION

(800)800-4APC Dept. E4
132 Fairgrounds Road, W. Kingston, RI 02892
CompuServe: GO APCSUPPORT
Internet: techs@apctech.UUCP or unet!apctech!techs



**EVERY DAY, PEOPLE DO THINGS
ON AST COMPUTERS THEY'VE NEVER DONE BEFORE.
IN SOUTH AFRICA, THEY REGISTERED TO VOTE.**

APRIL 26, 1994. NELSON MANDELA called it a day like no other before it. Some called it a dawn. Because, for the first time ever, all the people of South Africa went to the polls to vote for a new government.

Yet, months before the election, there was the overwhelming task of registering more than a million new voters. AST was chosen to help.

From urban townships to the Transvaal, AST Premmia™ computers were installed in voter registration offices. While mobile units and a roving technical support team reached out to remote tribal areas.

Soon, 400 AST computers were reliably creating voter identification cards at a rate of about 200,000 a week right up to election day. A

task that once took six weeks, done in mere minutes.

Today, the machinery of change is a computer. We're pleased to say it's often been designed and built by AST, one of the world's largest manufacturers of personal computers.

Our products include Premmia high performance business desktops, affordable Bravo business desktops,



a full range of Ascentia™ notebooks, Advantage!™ PCs for the home and small office, as well as Pentium™-based Manhattan™ servers. For more information, please



give us a call at 800-876-4AST.

One day, you might use our latest technology to do something new.

Perhaps you'll learn to use a spreadsheet program or E-mail the Johannesburg sales office.

Or, just maybe, learn what it feels like to be free.

YOU'LL LIKE THE WAY WE WORK™

AST.
COMPUTER



Ambra™

The Optimal Network or Home PC.

ZEOS® Ambra computers are not just another line of systems. They're the ideal solution to your network or home needs.

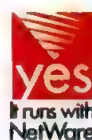
Why ideal? The ZEOS Ambra is loaded with hearty features in a slim case. We give you a choice of Intel processors—from 486SX-33 to 486DX2-66. You also get on-board local bus video, and enough bays to add a CD-ROM, 5.25" floppy drive and tape backup. The best news: all this is available at a lean price that will leave a little green in your pocket.

Speaking of green... ZEOS Ambra computers are green—meaning they use less energy. Why should you care? Because Ambra PCs cut down on pollution and lower your electricity bill. That can translate into big savings for you and your company!

To save you even more money, we lowered

prices *and* offer you several money-saving packages (many ready to ship the day you order) or the option to custom build a system to your exact needs. If you need a diskless workstation, we can even remove the hard drive and floppy disk drive, and install a network card.

What's more, the Ambra is 100% compatible with all major operating systems on the market.



You also get award-winning after-the-sale support. No company has won more *PC Magazine* Readers' Choice for Service & Reliability awards than ZEOS—six in all!

Whether it's connected to your network or plugging away at the home office, the ZEOS Ambra is the optimal solution for all your word processing or spreadsheet needs. It's the little powerhouse with a big punch at an exceptional value. Call a ZEOS Systems Consultant today at 800-554-7172.

Standard With Every ZEOS Ambra System:

- Genuine Intel 486 microprocessor.
- Intel's Pentium OverDrive upgrade socket.
- 128K SRAM cache.
- Two serial ports, one parallel port and one mouse port integrated.
- Five expansion slots: two VESA local bus and three 16-bit ISA.
- Small footprint case with four bays.
- System speed selectable through the keyboard.
- 200 watt power supply, switchable between 115/230V.
- ZEOS 101-key space-saving keyboard.
- Password feature built-in ROM for security.
- EPA Energy Star compliant.
- FCC Certified Class B; UL listed.
- ZEOS Customer Satisfaction Package.



Package 1

486SX-33	\$1195
486DX-33	\$1295
486DX2-50	\$1295
486DX2-66	\$1345

- 4MB RAM
- 214MB IDE hard drive, 32K cache
- 3.5" 1.44MB floppy drive
- On-board VESA local bus SVGA color video
- ZEOS 14" 1024 x 768 NT SVGA color monitor, .28mm dot pitch
- MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse

Package 2

486SX-33	\$1395
486DX-33	\$1495
486DX2-50	\$1495
486DX2-66	\$1545

- 8MB RAM
- 340MB IDE hard drive, 128K cache
- 3.5" 1.44MB floppy drive
- On-board VESA local bus SVGA color video
- ZEOS 14" 1024 x 768 NT SVGA color monitor, .28mm dot pitch
- MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse

800-554-7172

**24 Hours
a Day**



Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease; 30% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. Novell compatibility is Developer Tested Only. Novell makes no warranties with respect to this product. The Energy Star emblem does not represent EPA endorsement of any product or service. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside is a trademark of Intel Corporation. ZEOS is a registered trademark. Computers Now! is a registered servicemark. Ambra is a trademark of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1901 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS) AMB-PCM-94108

CIRCLE 038 ON READER SERVICE CARD



John C. Dvorak

Are You an Electronic Criminal?

I was appalled to discover that my attaching a small electronic copy of an article to a memo and sending it to a friend is considered some sort of evil deed and new, tight copyright laws will make that illegal—a terror that must be stopped. Horror of horrors!

Oh, puh-leeze. By year's end, the White House is expected to send recommendations to Congress expressing fears concerning electronic rights. The Commerce Department wants hearings. "Restrict electronic infringement!" Yeah, right.

Look, I'm as easily victimized by rampant photocopying and easy electronic access as anyone, but I sure don't see how copying a year-old article from Computer Database Plus, attaching it to a note, and e-mailing it to 14 people on an Internet newsgroup is a threat. A million people read the original. Despite any plea for sanity in a new copyright law, we're going to get some government mess making everyone in the office a proto-criminal.

While sending electronic versions of copyrighted material around a network is hardly new, it's happening more and more because people find it a valuable way to transmit important information. In the old days, you'd cut an article out of a magazine and staple it to a memo. You'd then attach a routing slip and send the article to a few dozen people around the office. Each would check the little box next to his name and pass the article to the next one down. The boneheads in our government will do their best to send us back to paper and routing slips. Geez. Better have the office manager order five more cases of Post-Its!

Of course, everyone will become a scofflaw and ignore any restrictions on electronic copies. If important, a copy will be passed around, period. There will be a few jerks who'll point the accusatory finger and moan over a lack of copyright protection, and they'll be excised quickly from a routing list. At some point, some poor slob will copy a *Time* article from the *Time* forum, and somebody will decide to make a federal case out of it. The guy will have to buy a hundred copies of *Time*, and a con-

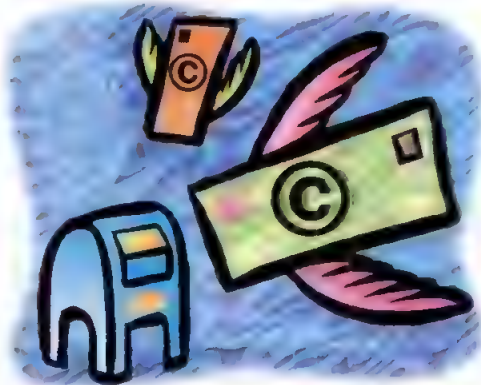
troversy will ensue. Then we'll discover some *Time* editor has been doing the same with a *Newsweek* disk. Another controversy will ensue, and it'll be a mess.

There's nothing wrong with the current copyright laws. What we need is a broader—not tighter—interpretation of *fair use*. People should be able to attach electronic documents to their personal memos. We have to be practical here. For each occasional download that ends up on some wideband distribution list, there will be thousands of documents read once and discarded. When someone starts an on-line magazine with a bunch of stolen material, that's when I'd get concerned.

Americans have always been in favor of a fast and free flow of information that borders on bootlegging. There's no time to fool around getting a license to make a photocopy of an article. There's no time to get a license for making an electronic copy of a Dvorak column for five people. Charles Dickens came to America in the mid-nineteenth century to see what he could do about American publishers bootlegging his books. He ended up making money by writing about the United States. And the bootlegging problem was eventually resolved. *So there.*

We have to realize that violating electronic copyrights is effortless. Redoing and printing a Dickens book was work! The effortless nature of electronic copying doesn't cheapen the value of the copyrighted material. Restraining access by law is counterproductive, and that's what the lawmakers propose to do. The *fair use* law must be extended to allow legal, limited redistribution of anything received on-line. Give these fears a rest.

A preliminary report on the status of this fiasco is available on the Internet at itf.doc.gov.



We don't need a tighter copyright law, just a broader one that allows redistribution of on-line material.

IF YOU'RE LOOKING FOR THE VERY BEST IN NOTEBOOK COMPUTING, MPC'S SOLUTION IS AS SIMPLE AS 1, 2, 3.



LCD STATUS INDICATOR
CONVENIENTLY DISPLAYS KEY LAPTOP
FUNCTIONS—INCLUDING BATTERY
LIFE AND POWER MANAGEMENT.

1 **ONE EXTRA PCMCIA SLOT.** WHILE
OUR COMPETITORS INCLUDE ONE
PCMCIA TYPE III SLOT, WE GIVE
YOU A TYPE III PLUS AN EXTRA
TYPE II SLOT (PCMCIA TYPE IV),
ALLOWING YOU INSTANT FAX,
MODEM, NETWORKING AND OTHER
CAPABILITIES.



2 **TWO-BATTERY TECHNOLOGY.** MPC NOTEBOOK
COMPUTERS GIVE YOU AN EXTRA BUILT-IN BATTERY,
SO YOU DON'T HAVE TO SHUT DOWN AND
RE-BOOT. SIMPLY SLIDE OUT THE DISCHARGED
BATTERY AND HOT-SWAP A FRESH BATTERY IN,
WITHOUT INTERRUPTING YOUR WORK.



**NEW
DX/4
CPU**

UPGRADEABLE CPU LETS
YOU EXPAND YOUR COMPUT-
ING POWER AS YOUR PERFOR-
MANCE NEEDS CHANGE.



3 **3-VOLT DESIGN MEANS LESS**
POWER CONSUMPTION, PROVIDING
MORE OPERATING TIME, LESS
HEAT AND GREATER RELIABILITY.

MPC Technologies, Inc., offers a complete line
of high end notebook computers providing you with
fully upgradeable systems, the latest technology and
complete multimedia options.

MPC products incorporate ergonomic features

and 800 Series, featuring the
DX2-50, the new DX4-75 and
DX4-100 processors with built-
in sound and CD ROM capa-
bility.

700 SERIES SPECIFICATIONS

- DX2-66, DX4-75 or 100 MHz
- 8MB RAM, max. 32MB EMS 4.0 support
- 3.5" 1.44MB FDD
- 140MB, max. 540MB HDD removable
- 9.5" color dual scan STN LCD
- 1MB Video Local Bus
- VGA port support 1024x768x256 color
- New PCMCIA IV slots, support 1 type II & 1 type III
- Built-in 19mm extra-large centertrack ball
- Built-in 16-bit business sound system
- True 3.1 Volt system
- Advanced SMI power management
- System status panel
- Upgradeable LCD screen
- NiMH battery with hot swapping features
- I/O: parallel, serial, VGA, audio in/out, docking connector
- Built-in microphone
- MS-DOS
- 5.7 lbs., including battery pack

for all the comfort of full sized desktop systems.
There's a built-in palm rest and responsive center
trackball; and there's an LCD display that monitors
important notebook functions including battery life
and power management.

The latest technology is offered in the new 700

700 and 800 Series
Monochrome, Dual Scan color,
and Active Matrix systems offer
full CPU upgradeability.

Upgrade options are available
so you can expand memory or
hard drive capacity.

Feature for feature MPC
delivers the best value in notebook solu-
tions. Let one of our skilled sales consul-
tants help you determine which MPC
System is right for you.



NEW!

CD-BOOK
THE COMPLETE COLOR
MULTIMEDIA PORTABLE, WITH
4MB 340MB FOR ONLY

\$3499

MPC BASIC	
750 486DX2-50 MONOCHROME 4MB RAM, 260MB HDD	\$1,699
750 486DX2-50 DUAL SCAN 8MB RAM, 340MB HDD	\$2,479
775 486DX4-75 DUAL SCAN 8MB RAM, 340MB HDD	\$2,669
MPC BUNDLE	
WITH WINDOWS FOR WORK GROUP, PCMCIA 14.4 FAX/MODEM CARD, CAR ADAPTER & MPC CARRYING CASE	
750 486DX2-50 DUAL SCAN 8MB RAM, 340MB HDD	\$2,699
775 486DX2-75 DUAL SCAN 8MB RAM, 524MB HDD	\$3,069
775 486DX2-75 DUAL SCAN 16MB RAM, 524MB HDD	\$3,429
MPC DELUXE	
WITH WINDOWS FOR WORK GROUP, PCMCIA 14.4 FAX/MODEM & 2 IN 1 ETHERNET CARD, CAR ADAPTER & MPC CARRYING CASE	
799 486DX4-100 DUAL SCAN 16MB RAM, 524MB HDD	\$3,699
799 486DX4-100 DUAL SCAN 24MB RAM, 524MB HDD	\$3,999
799 486DX4-100 TFT ACTIVE 24MB RAM, 524MB HDD	\$4,999
INCLUDING DOS, WINDOWS FOR WORK GROUP, LIFE STYLE CD-ROM & 5 CD BONUS PACK INCLUDING ENCYCLOPEDIA, THE ANIMAL CHESSMASTER, WORLD ATLAS & MAVIS BEACON TEACHES TYPING AND CARRYING CASE	
850 DX2-50 4MB RAM, 260MB HDD	\$2,999
875 DX4-75 4MB RAM, 340MB HDD	\$3,499
899 DX4-100 4MB RAM, 524MB HDD	\$3,799
MAG DX 15F MONITOR & NMB NOVELL CERTIFIED KEYBOARD BUNDLE: \$399	



MPC Technologies, 2915 Daimler St., Santa Ana, CA 92705. Local: (714) 724-9000. (800) MPC-8088. Fax: (714) 724-9648. BBS: (714) 724-1519/724-1543. Tech. Support: (800) 672-6686. 24-Hour Fax/Back: (800) 672-8882.

800 SERIES SPECIFICATIONS

- DX2-50, DX2-66, DX4-75 or 100 MHz
- Built-in double speed CD-ROM supports 235K/s
- Free Life Style CD Pack (4 CDs) & 6 CDs of Encyclopedia 6.0, Animals, Chessmaster 4000, World Atlas winners, US Atlas winners, Mavis Beacon Teaches Typing 2.0
- 4MB expandable to 20MB
- 9.5" Dual Scan & TFT Active LCD screen
- Accelerated 32-bit VESA Local Bus VGA with 1MB
- 1024x768x256 color simultaneous display on LCD & external monitor
- Built-in printing device (Vesa Print)
- PCMCIA Type III slot
- 16-bit stereo (Sound Blaster compatible)
- NiMH battery
- Advanced power management
- Built-in microphone & stereo speakers
- I/O: parallel, serial, VGA & audio in/out
- DOS & Windows for Work Group
- Carrying case
- 6.6 lbs. (15) with battery

1-800-672-8088



Terms: No sub-charge for MasterCard or Visa orders. Purchase orders accepted from approved corporations, government institutions and universities. MPC pricing subject to change without notice. All trademarks and registered trademarks are of their respective companies.

Inside Track

O

Id Chips Never Die Dept.:

How many out there remember the Zilog Z-80 chip? It **dominated** personal computing from the late 1970s right up until about 1983. Fact is that last year Zilog sold more Z-80s than ever before (30 million at about a dollar a shot). It's possible that the actual total runs about **60 million** or more if you add in the half a dozen licensees. This chip, as well as the best-selling Motorola 68000, ends up in hand-held calculators and other electronic paraphernalia. Sega and other home entertainment companies use it. The Motorola factory sells about 36 million 68000 chips per year.

Besides being the chip in the original Mac (which quickly moved to the 68020, 68030, 68040, and the PowerPC), the 68000 powered the early Sun workstations. I remember when you got one million instructions per second for \$20,000! Finally, there's the old 6502. That was the chip found in the venerable Apple II. Today, a 16-bit version dubbed the 65C816S powers the Super Nintendo.

Development work on these chips hasn't ended. Zilog recently announced the Z-380, a full 32-bit chip that's Z-80-compatible with the 8-bit chip. The Zilog chip utilizes 4 full 32-bit registers so it can do fast context switching. The external bus is 16 bits wide and the chip can address up to 4GB of memory. It costs about ten bucks out of the chute. Maybe those aging **die-hard CP/M fanatics** running those old clunkers will find solace here. Too bad all the companies that supported the old hardware architectures are mostly out of business today. This chip, along with some cheap memory, might revitalize the hobbyist movement, which was always oriented toward inexpensive computing. While we're all scrambling for pricey Pentiums or waiting for the pricey PowerPC, we're overlooking a **cheap solution**. Now all we need is a graphical user interface to run on it. Hmmm, I wonder if the source code for Digital Research's old GEM operating system is available?

Meanwhile, Motorola plans a **new derivative** of the original 68000, called the **Advanced Consumer Electronics Processor**. Obviously, this device is designed for game machines and set-top television boxes. As for the 65C816, look for that chip to be used in a computer named after its designer, William Mensch. Yes, the Mensch Computer running Mensch Works.

Microsoft Watch. So I'm told that the day Chicago ships, the bug-fix upgrade will be immediately ready for announcement. A marketing ploy, it seems. Person-

According to a rumor floating around the offbeat hackers conference, Defcon II, the day Chicago ships, the bug-fix upgrade will be immediately ready for announcement. I find this hard to believe.

ally, I find this plan **hard to believe**, but it comes from a disgruntled Chicago coder who thinks the idea **stinks**, because he and his pals will be blamed for any faults found in the initial version. This was one of many odd Microsoft rumors floating around the **offbeat hackers conference**, Defcon II, in Las Vegas.

Genuinely Interesting Hardware Dept.: I can't recommend more highly the six-disk CD-ROM changer from Pioneer. Using a quadruple-speed motor, this player is the beefed-up version of the mechanism found in the trunk of the early Lexus automobile as well as compact disk players for the home. This is simply **the CD-ROM player of choice** for the

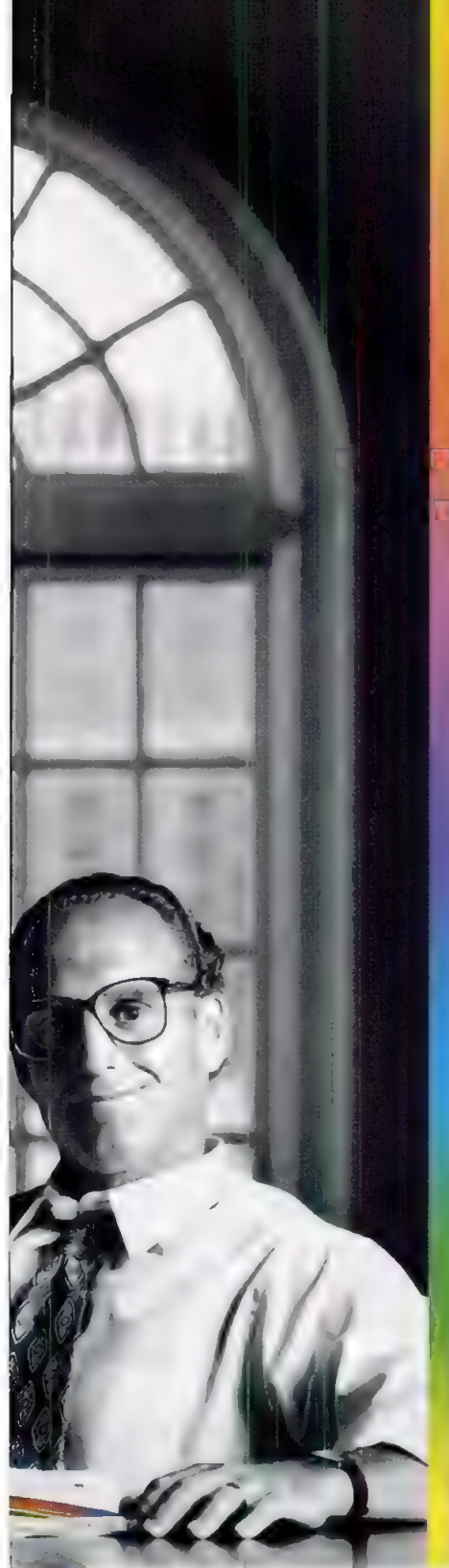
single-user workstation. And for you power users, OS/2 seems to like this drive and has no trouble locating it for CD-ROM-based system installation. Having said that, I can make one suggestion: It would be cool if, in addition to the six-pack cartridge, there were a one-disk slide-out drawer. My Pioneer disk changer is loaded with six disks I use all the time (Microsoft Bookshelf, Computer Select, Phone Disc Business, etc.), and I'd like to be able to easily look at other disks only occasionally. It's too much work to take out the whole cartridge just to look something up from a baseball statistics disk once in a blue moon. It would be better if a drawer for the lone disk were available. Still, this is a great piece of equipment. Pioneer says the company has serious intentions to dominate the CD-ROM player business in the years ahead. Highly recommended.

We Be Green Dept.: (Please read this column under a dim light.) The "green" phenomenon is spreading around the world, no place more so than in Taiwan. I'm referring to all the power-saving tricks to help save energy and the environment. In Taiwan, the vendors have gone **gah-gah over green**; it's green this and green that, with a variety of official levels of greenness. You'll see advertised products that are light green, medium green, dark green, or deep green, each a reference to bolder energy-saving steps. At times it gets silly. One vendor at the Computex show had the world's first "green" mouse. He even put a little sticker on it.

Taiwanese companies are getting serious about the environment. I'm impressed by a **new foam packaging material** called Hidem foam developed by the Gin Young Company. Hidem foam uses water, not chlorofluorocarbons, as a foaming agent. After forming, the stuff breaks down when exposed to sunlight. A little-known fact is that Taiwan is the world leader in plastics technology. □



* In Canada call 1-800-387-2862 Ext. 8773. You may also obtain information through the Internet at the following location: http://www.hp.com/US/PE/HP/HPEALS/peripherals_main.html.
Adobe and Postscript are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. ©1994 Hewlett-Packard Company 7E12862



In color. In no time.

The speedy new **HP Color LaserJet.**

You've already taken the first step into color printing. And it's really made a difference in your users' work. But as demand for color has grown, you've noticed that what they need is more speed.

Now, with Hewlett-Packard's latest innovation, you can take the next step. The new Color LaserJet printer. It keeps pace with the workload by delivering up to 2 sharp, colorful pages every minute. Or 10 black & white pages. Now, multiple copies of reports and proposals can easily be done in color. Merged text and

graphics documents are laser sharp. On plain paper. And printed permanently.

To make color easier to use, the Color LaserJet offers ColorSmart. For compatibility, there's enhanced HP PCL5 and optional genuine Adobe® PostScript® Level 2 software. Add an optional industry-leading HP JetDirect card and you've got a color laser printer that works seamlessly on virtually any network.

As you'd expect, this move up to laser color comes with HP's renowned commitment to service and support. For more information or a sample from the fast new Color LaserJet, call 1-800-821-8440, Ext. 8573.*

You do your job. We'll do ours.
HP LaserJet Printers



**HEWLETT®
PACKARD**

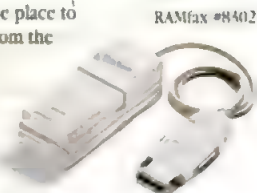
King of the Road



TAKE A VACATION FROM THE OFFICE WITHOUT LOSING TOUCH.

Joplin, MO— Data Traveler Portable Storage

Data Traveler is just the place to store your thoughts from the road. It installs via the parallel printer port on any desktop, laptop or notebook system providing increased capacity, portability and data security. It's just the ticket for transferring data between systems. Providing fast, on-line data backup and recovery and equipped with a pass-through printer connection for uninterrupted printer use, Data Traveler just makes sense for use in the office or on the open road. The QuickSwap™ feature allows for convenient hot-swapping of data. At just three pounds, including the four hour battery, the feather-weight Data Traveler is the perfect storage system when you're traveling light.



RAMfax #8402

San Bernardino, CA— Kingston Memory Upgrades

Kingston gives you added horsepower under the hood of your notebook for today's memory-intensive operating systems and application software. Why Kingston? We're the leader of the pack in compatibility and selection, whether your notebook is from Compaq, Toshiba, Apple, NEC, AST, IBM or any other popular manufacturer. Kingston's got you covered.



Flagstaff, AZ— DataRex PCMCIA Data/Fax Modem

Any location, any destination, and just about any notebook. DataRex is the fastest, most compatible data/fax modem you'll find no matter how far you travel. And at just \$279 retail, DataRex leaves a lot of money for eats on the road. DataRex guarantees you 100% seamless compatibility with your PCMCIA Type II compliant notebook or sub-notebook. The Card and Socket Services provided make for trouble-free installation and comprehensive compatibility. Award-winning WinFax Fax/Communications software is included so you'll be up and running quickly! DataRex also features MNP 10, the highest error-correction level available for trouble-free transmission under adverse conditions, including cellular connections and remote locations. And of course DataRex offers 16550 UART for perfect transmission under Windows and OS/2.



RAMfax #8501

Saint Louis, MO— EtherX Portable Networking Products

When you're on the road, you don't want unnecessary delays or unpleasant surprises. Our engineers built our portable networking products to be as fast as you'll find and compatible with just about every PC and network operating system you'll come across in your travels. EtherX PCMCIA Ethernet adapters are tested compatible in over 50 Type II compliant systems. Our dual-interface Pocket Ethernet Adapter is compatible with just about any system, cable type or network operating system around. And our prices? They leave the competition miles behind.



RAMfax #8106



RAMfax #8106



A Travel Partner You Can Count On

It's always a good idea to test your equipment before you hit the highway. That's why we test each and every Kingston upgrade before it's shipped. And if you run into a problem—free, comprehensive technical support is just a phone call away.



King of Compatibility Road

You'll find a lot of different systems and software on the great open highway. At Kingston, commitment to compatibility is a road we've traveled many times before. Your Kingston portable upgrade will work flawlessly with your system, your software and any cable or phone jack you'll come across. We guarantee it.



Call For Directions

Give us a call, from your office, your house or any road-house diner at (800) 835-6575. We'll direct you to a nearby Kingston dealer or talk shop on any of our 1300 upgrade products. Dial RAMfax at (714) 435-2677 for a full listing of our fine line of Kingston Portable Products.



Kingston
TECHNOLOGY CORPORATION

THE INSIDE NAME IN UPGRADES

17600 Newhope Street, Fountain Valley, California 92708
(800) 835-6575 (714) 435-2600 Fax (714) 435-2699

All Trademarks and Registered Trademarks are of their respective holders. Kingston Technology is a registered trademark of Kingston Technology Corporation.

PC MAGAZINE CIRCLE 106 ON READER SERVICE CARD



Jim Seymour

The Consumer (Influence) Reigns

I've been calling this latest trend "the consumerization of software," but the phrase isn't mine. I have a crabby friend whom I call, sometimes to his face, the Young Reprobate (YR). Critical of nearly everything and fusty to the core, the YR was the first

person I heard use the "consumerization of software" phrase. Needless to say, he meant it as a criticism.

That pulled me up short, because I'd been thinking the explosion of the consumer side of the PC software market was a good thing. Not so, he insisted.

We have the consumerization of software to blame for "gaudy, insanely graphical interfaces, no better than and often worse than we had in DOS," he said. For all these "ridiculously jazzy-looking packages showing up on the shelves at computer stores." For applications appearing on CD-ROMs as well as on floppy disks. For the disappearance of software manuals "you could hold in your hand and browse at your leisure," increasingly replaced by on-line help files on those wretched CD-ROMs. For manuals, where they still exist, "written for three-year-olds." For "all this crazy software pricing" and "a market hopelessly fragmented into competitive upgrades, version upgrades, bundles, suites, and standalones—all for the same product."

It's clear the consumerization of software—let's call it the CofS—has a lot to answer for.

Excuse me, but I *still* think the CofS has been a good thing, for you and me as well as for software publishers.

Seems to me the eruption of the home-PC market has given us better and more informative packaging, the convenience of installing new applications and upgrades from CD-ROMs instead of a dozen floppy disks, instant on-line versions of manuals, more legible and more readable printed manuals, and lower—often *much* lower—prices for mainstream products.

Oops. I think the YR and I are working from the same list.

Whoever said software had to be fussy, obscure, and ugly? Why shouldn't

consumer packaged-goods boxes and pricing and promotion come to software? What's wrong with rich on-line help at the touch of a key?

NEW DIRECTIONS

Not only has the CofS influence made software easier to buy and use, it's pushed the software business off in new directions that are paying dividends for every PC user.

A good case in point: DeLorme Mapping Corp.'s new Map 'n' Go package. This one comes packed in a huge 11-by 16-inch box, inside of which you'll find an equally huge four-color North American road atlas—one of those big, easy-to-read highway-map books that usually wind up on the back floor of the car, their covers ripped and torn, under Junior's feet. There's also a CD-ROM.

DeLorme bills this thing as "the complete travel planner for North America," and they're not kidding. Pop the CD-ROM in your PC. Tell the program where you want to start from and where you want to travel to—say, Tulsa to Sarasota—and whether you want a fast, short, or scenic route. If you're Interstate-phobic or a back roads buff, click a button to choose or eliminate those options, too.

Bingo: Map 'n' Go plots out the best route, then shows

you the first screen of a page-by-page customized Travel Plan that includes complete driving instructions and a map with your route highlighted by a wide line, much like the routes highlighted in yellow on AAA trip maps.

The program is very smart. If you choose a scenic alternative, it will give you a different route home than you took on the way out. Quickest-way trips are plotted in yellow, shortest-route trips in green, scenic trips in magenta. You can even add your hometown as an automatic starting and ending point.



Some may spurn the consumerization of software, but for most of us, it's cause for celebration.

PC FAN FAILURE IS ALARMING.

Now, for only \$39, your computer can have 3-way thermal protection:

- 1. Loud audible alarm warns you if temperature hits 110°F.**
- 2. Signal for optional remote monitoring given at 110°F.**
- 3. The computer is automatically turned-off at 118°F.**

Don't let PC fan failure cost you your system! Install our **110 TwinAlert** to detect overheating *before* damage occurs. At 110°F you'll get a loud audible alarm and a signal for optional remote monitoring. And, if your computer is unattended and the temperature continues to rise to a dangerous 118°F, the **110 TwinAlert** will save your machine by *safely* shutting-off its power! The inexpensive **110 TwinAlert** is compact, easy to install, and works in any computer.



110 Alert™ (audible alarm only).....\$19.00
110 TwinAlert™ (all features).....\$39.00

PC POWER & COOLING, INC.

5995 Avenida Encinas, Carlsbad, CA 92008, (619) 931-5700, (800) 722-6555, Fax (619) 931-6988
We accept Visa, MC, CDD, or PO on approved credit. ©1994 PC Power & Cooling, Inc. Most orders shipped same day.

CIRCLE 080 ON READER SERVICE CARD

Jim Seymour

Click a button and you get a series of gorgeous, customized map printouts to stick in the glove box for your trip. These maps include step-by-step instructions—"East on 7th St"—that are keyed to pages in the print atlas, and include running mileage and estimated total travel time in the margins.

While the printer is grinding out the maps, take a look at the program's *Along the Way/Look and Listen* feature: a list of attractions along and near your route—you determine just how far off your path—as well as pop-up color photos, text, and audio descriptions of those attractions.

Want some advice on hotels along the way? Click and it's yours. Tips on restaurants? Ditto.

TAKE IT ALONG

As nice as these displays are, DeLorme understands that not all of us take our notebook PCs on vacation with us—nor if we do, do we want to look up driving instructions in the middle of heavy traffic. (Uh, honey, would you please boot up the PC, call up the return segment of the trip, and tell me which way to turn at this intersection. . .?)

So the package provides printouts of everything, not just the maps. The *Travel Plan* printouts, with point-to-point distances and expanded instructions ("W on US 71 [US2, FLA 50] .1 MI."), are especially useful.

Consumers would never put up with on-screen-only displays; DeLorme understands that.

That said, if you *do* have a notebook PC with a portable CD-ROM drive, it'd be awfully nice to have access to *Map 'n' Go* along the way. One of the program's nicest features is that when you're looking at a photo of an attraction and listening to a description of it, you can click on a *Locate* button and get a nicely-scaled on-screen map of the area surrounding the attraction, so you can tell which way to go to find it, and how far off the road it is. Imagine doing that en route.

All pretty nice, huh? So what does this wonder cost? Maybe \$395? \$295? \$179? Nope, just \$50 on the street.

That's the real consequence of the consumerization of software: new kinds of products, at extraordinary prices. Widely available, with rich supporting materials. And no "computer geek credentials required" sticker on the side of the box. Isn't that what we've been waiting for? □



IF FINDING MISSING CHILDREN WERE THIS EASY, WE WOULDN'T NEED YOUR HELP.

Missing children don't advertise themselves. In fact, since the majority of them are abducted by a parent, they might not realize they're "missing" at all. That's what makes our job tougher, and why we're asking for your help.

In your professional capacity, you might be able to identify an abducted child, or a parent who may have abducted a child. If so, please contact Child Find of America. Or ask the parent to call us for confidential mediation. Our toll-free hotline is 1-800-A-WAY-OUT. It could just be the way out they're looking for.



CHILD FIND OF AMERICA, INC.



new!

**5 products
in 1!**

HiJaak Graphics Suite

version 3.0

Low Low Price!
See local
dealers for low
introductory
prices!

You Don't Have To Be An Artist To Achieve "Suite Success!"

new! 5 products in 1!

paint · draw · enhance · capture · convert · trace · search and find all your graphics



**SUCCESS
with graphics!**

HiJaak Graphics Suite

version 3.0

① HiJaak Browser

New HiJaak Browser is the Suite desktop and file manager. Launch all your favorite programs from HiJaak Browser. Also, quickly search and visually find all your files using keywords and thumbnails. Even play **multimedia** files right from HiJaak Browser.

② HiJaak PRO 3.0

With new HiJaak PRO 3.0, eliminate graphics incompatibility! Convert images between 75+ formats including the ability to convert raster to vector!

③ HiJaak TouchUp

HiJaak TouchUp's, easy-to-use paint tools and over 30 special effects, allow you to create eye-catching graphics.

④ HiJaak Smuggler

HiJaak Smuggler makes searching, finding and importing graphics easy. Save Time! Never leave your active application.

⑤ Micrografx Windows DRAW!

Now create or modify vector drawings with Micrografx Windows DRAW! It's included, FREE.

HiJaak Graphics Suite

- ① HiJaak® Browser v3.0™
- ② HiJaak® PRO v3.0™
- ③ HiJaak® TouchUp™
- ④ HiJaak® Smuggler™
- ⑤ Micrografx® Windows Draw™

NEW SUPPORT FOR: CorelDRAW! CDR, Adobe Illustrator EPS, WordPerfect WPG2, and Multimedia sound and video files.

**BONUS
CLIPART!**

**2600 vector and 200+ full
color images on CD ROM!**



71 Commerce Dr.
Brookfield, CT 06804-3405
803-740-2400 • 803-775-5694 FAX

HiJaak® Graphics Suite™, HiJaak® PRO™, HiJaak® Browser™, HiJaak® Smuggler™, HiJaak® TouchUp™, IGOR™, AutoCAT™ and Inset® are trademarks of Inset Systems Inc. All other product names mentioned are trademarks of their respective manufacturers. © 1992, 1993 and 1994 Inset Systems Inc. All rights reserved.

Available at:
Egghead, Computer City,
CompUSA, PC Connection,
MicroWarehouse
and other fine resellers.

HiJaak Graphics Suite

To order, upgrade, or to request a
free info pack (#IGAA)

call **800-DR INSET**
ext. 9699

(1-800-374-6738 ext. 9699)

CIRCLE 033 ON READER SERVICE CARD



.....the..... Expert's Choice

The Critics Rave

Hardly a month goes by when a Micron PC doesn't pick up a new award or citation: recently, Micron's P90PCI Powerstation earned *PC Magazine's* prestigious Editors' Choice Award and Micron's superb reputation earned them *PC Magazine's* Readers' Choice Service & Reliability award. *PC WEEK*, *Byte*, *PC World*, *Windows Sources*, and others have also cited Micron for technical excellence and exceptional value.



The Editors Marvel

"The system's components and general design dazzled,"—*PC Magazine* June 28, 1994. The P90PCI PowerStation outscored all of the competition—including Dell and Zeos Pentium PCs—in the Winstone 94, Disk Winmark and Disk benchmark tests. This was no surprise, however—in the April 26th issue, *PC Magazine* also ranked the Micron P90PCI above all the competition in key benchmark tests.

The High-Performance/Value Leader

As a fully integrated manufacturer of semi-conductors and components, Micron can offer the latest configurations at the lowest prices, and still provide outstanding customer service and technical support. "If value is paramount, the Micron P90PCI offers all you'll need in higher order computing,"—*PC Magazine* June 28, 1994.

MICRON
COMPUTER, INC.

Order Now
800-388-6334



July 1994



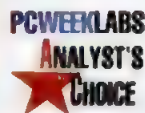
June 28, 1994
POWERSTATION



April 26, 1994
MAGNUM



January 26, 1993
MAGNUM



June 27, 1994
POWERSTATION



December 1993
WINSTATION



December 1993
WINSTATION





Micron 17FGx pictured



June 1994
MAGNUM



May 1994
POWERSTATION



March 1994
MAGNUM



September 1993
MAGNUM



May 1994
POWERSTATION



PC
MAGAZINE
EDITORS'
CHOICE

June 28, 1994
Micron P90PCI
PowerStation

"...the Micron P90PCI combines an excellent design with quality components to create a powerful Windows machine."

PC Magazine 6/28/94

PCWEEKLABS
ANALYST'S
CHOICE

June 27, 1994
POWERSTATION

P90PCI PowerStation

- Intel™ 90MHz Pentium™ processor
- 256K write-back cache (up to 512K)
- 2X CD-ROM drive, 3.5" floppy drive
- 4 ISA, 2 PCI, 1 ISA/PCI, Flash BIOS
- PCI graphics accelerator (2MB)
- Desktop "Tool-Free" chassis
- MS Mouse, 101-key keyboard
- MS-DOS® & Windows® for Workgroups
- Microsoft® Office 4.2 CD*



- A**
- 8MB RAM (expandable to 192MB)
 - 420MB 14ms IDE hard drive (PCI)
 - 15" Micron 15FGx, 1280NI, .28mm, MPRII

\$2,599 (lease '94/month)

- B**
- 16MB RAM (expandable to 192MB)
 - 527MB 12ms IDE hard drive (PCI)
 - 15" Micron 15FGx, 1280NI, .28mm, MPRII

\$2,999 (lease '108/month)

- C**
- 32MB RAM (expandable to 192MB)
 - 1.0GB 10ms SCSI-2 hard drive (PCI)
 - 17" Micron 17FGx, 1280NI, .28mm, MPRII

\$4,299 (lease '147/month)

- D**
- 64MB RAM (expandable to 192MB)
 - 2.0GB 9ms SCSI-2 hard drive (PCI)
 - 17" Micron 17FGx, 1280NI, .28mm, MPRII

\$6,299 (lease '216/month)

*MS Office documentation on-line. Hard copy available for additional charge.

.....the..... User's Choice

They Keep Choosing Micron

Over and over, Micron is consistently ranked highest in overall customer satisfaction:

PC Magazine 1994 Readers' Choice Service &

Reliability Awards gave Micron the highest ratings in the categories of Overall Reliability, Satisfaction with Technical Support and Future Likelihood of Buying Again.



Quality Keeps Them Coming Back

As a leading manufacturer of memory chips and computer components for over fifteen years, Micron offers a superb combination of technical superiority and high reliability, backing its PCs with a knowledgeable, responsive technical support organization.

The Intelligent Choice

Smart buyers seek the highest performance for their dollar: "The 466VL came with everything we've come to expect in a high-performance machine," wrote *PC World*.

433 Magnum LP

- Intel™ 486SX 33MHz processor
- Pentium™ Technology Ready (ZIF)
- 4MB RAM (expandable to 48MB)
- 210MB 14ms IDE hard drive
- Local Bus Graphics (1MB)
- 14" Micron 14G, 1024I, .28mm
- Low profile chassis—NEW!
- 5 16-bit ISA slots
- MS-DOS & Windows for Workgroups
- Microsoft Mouse, 101-key keyboard
- Microsoft Works for Windows

\$1,199 (lease \$43/month)



April 26, 1994
MAGNUM



January 26, 1993
MAGNUM



March 1994
MAGNUM



June 1994
MAGNUM



September 1993
MAGNUM

- "Once in a while a company really hits all the hot buttons for PC buyers."
- "Micron Computer gets high performance from quality components and thoughtful design."
- "The Micron 466VL Magnum CD was easily the best Windows performer."

PC Magazine April 26, 1994

466PCI Magnum

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 256K write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI
- 2X CD-ROM drive, 3.5" floppy drive
- Desktop "Tool-Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups



466VL Magnum
Same low Price!

A

- 8MB RAM (exp. to 64MB)
- 420MB 14ms IDE HD (PCI)
- PCI graphics accelerator (1MB)
- 14" Micron 14G, 1024I, .28mm
- Microsoft Works Multimedia CD*

\$1,799 (lease \$65/month)

B

- 16MB RAM (exp. to 64MB)
- 527MB 12ms IDE HD (PCI)
- PCI graphics accelerator (1MB)
- 15" Micron 15FGx, 1280NI, .28mm, MPRII
- Microsoft Office 4.2 CD*

\$2,399 (lease \$87/month)

*MS Works and Office documentation on-line. Hard copy available for additional charge.



486 Family MPC

NEW!

- 2X CD-ROM drive, 3.5" floppy
- 16-bit Sound Blaster card, speakers & Kraft Thunderstick joystick
- 9600/2400 Fax/Modem & Winfax Lite
- Local bus graphics (1MB)
- 14" Micron 14G, 1024i, .28mm
- Low profile chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS Works Multimedia on CD*, Encarta 94 CD, Quicken CD Deluxe Edition
- Trial subscriptions for CompuServe, America OnLine & Prodigy
- 3 LucasArts CD games: Rebel Assault, Indiana Jones & Day of the Tentacle

A

- Intel 486SX 33MHz processor
- 4MB RAM (exp. to 48MB)
- 210MB 14ms IDE hard drive

\$1,399 (lease \$51/month)

B

- Intel 486DX2 66MHz processor
- 8MB RAM, 128K cache
- 420MB 14ms IDE hard drive

\$1,899 (lease \$69/month)

P90 Family MPC

- Intel Pentium 90MHz processor
- 8MB RAM, 256K write-back cache
- 420MB 14ms IDE hard drive (PCI)
- 2X CD-ROM drive, 3.5" floppy
- 16-bit Sound Blaster card, speakers & Kraft Thunderstick joystick
- 14.4/9600 Fax/Modem & Winfax Lite
- PCI graphics accelerator (2MB)
- 15" Micron 15FGx, 1280NI, .28mm, MPRII
- Desktop "Tool-Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS Office 4.2 CD*, Encarta 94 CD, Quicken CD Deluxe Edition
- Trial subscriptions for CompuServe, America OnLine & Prodigy
- 3 LucasArts CD games: Rebel Assault, Indiana Jones & Day of the Tentacle

\$2,899 (lease \$105/month)

.....the..... Family's Choice

A Great Family To Choose From

Each Micron Family MPC system comes with a complete multimedia configuration including a 16-bit Sound Blaster card, speakers, CD-ROM drive and fax/modem, plus a selection of bundled CD software and trial on-line subscriptions for immediate enhanced home productivity and entertainment.



A Great Bundle For Less Than A Bundle

Micron's Family MPCs come with everything you need to enjoy the modern multimedia experience. *Encarta 94*, Microsoft's interactive multimedia encyclopedia, lets kids and adults learn more and have fun at the same time. Trial subscriptions for *CompuServe*, *America OnLine* and *Prodigy* put you on the way to exploring on-line information services. *Microsoft Works* and *Quicken Deluxe Edition* on CD, plus a built in fax modem, give you the latest office conveniences at home. You also receive the latest CD games from LucasArts, *Rebel Assault*, *Day of the Tentacle*, and *Indiana Jones and the Fate of Atlantis* let you relax with—or without—the kids.

MICRON
COMPUTER, INC.

Order Now
800-388-6334

*MS Works and Office documentation on-line. Hard copy available for additional charge.

.....the..... Choice is Yours!

MULTIMEDIA UPGRADE KIT



- SoundBlaster 16 sound card & speakers
- Kraft Thunderstick Joystick
- Microsoft Encarta 94 CD
- Quicken CD-ROM deluxe edition
- 3 LucasArts CD games: Rebel Assault, Indiana Jones & Day of the Tentacle

\$200

Upgrade available with system purchase only.
Upgrade available within 30 days of system purchase only

- Next day shipping on selected systems
- 30-day risk-free money-back guarantee
- One-year express parts replacement
- Lifetime toll-free technical support
- On-site service available

MICRON

COMPUTER, INC.

Micron Computer, Inc.
900 E. Karcher Road Nampa, ID 83687
208-465-3434 FAX 208-465-3424
Purchase Order FAX 208-467-5384
Mon-Fri 7AM-8PM Sat 8AM-5PM (MST)

800-388-6334

© 1994 Micron Computer, Inc. All rights reserved. All prices and specifications subject to change without notice. Micron Computer, Inc. cannot be responsible for omissions and/or errors in typography or photography. Intel, Intel Inside, and Pentium are registered trademarks of the Intel Corporation. Microsoft is a registered trademark and Windows, Windows NT, and the Windows logos are trademarks of Microsoft Corporation. All other company trademarks are trade names of each respective company. Prices do not include shipping and handling. 30-day money back guarantee does not include return freight and handling charges, applies only to Micron brand products, and begins from date of shipment. All returns require RMA numbers and must be shipped in the original condition prepaid and insured. Lease prices based on 36-month lease.

MORE PENTIUM

P66PCI PowerStation

- Intel 66MHz Pentium processor
- 256k write-back cache, Flash BIOS
- 4 ISA, 2PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (2MB)
- Desktop "Tool-Free" chassis, 3 fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office 4.2 CD*

A

- 8MB RAM (to 128MB)
- 420MB 14ms IDE hard drive (PCI)
- 15" Micron 15FGx

\$2,399

(lease \$87/month)

B

- 16MB RAM (to 128MB)
- 527MB 12ms IDE hard drive (PCI)
- 15" Micron 15FGx

\$2,799

(lease \$101/month)

C

- 32MB RAM (to 128MB)
- 1.0GB 10ms SCSI-2 hard drive (PCI)
- 17" Micron 17FGx

\$4,099

(lease \$141/month)

P66PCI PowerServer

- Intel 66MHz Pentium processor
- 512K write-back cache, Flash BIOS
- PCI 32-bit Fast SCSI-2 controller
- 5 EISA, 2PCI, 1 EISA/PCI slots
- 2X SCSI-2 CD-ROM drive
- 3.5" floppy drive
- PCI graphics accelerator (2MB)
- Tower: 10 drive bays, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office 4.2 CD*

A

- 16MB RAM (to 192MB)
- 527MB 12ms SCSI-2 hard drive (PCI)
- 14" Micron 14G

\$3,399

(lease \$117/month)

B

- 32MB RAM (to 192MB)
- 1.0GB 10ms SCSI-2 hard drive (PCI)
- 15" Micron 15FGx

\$4,299

(lease \$147/month)

C

- 64MB RAM (to 192MB)
- 2.0GB 9ms SCSI-2 hard drive (PCI)
- 17" Micron 17FGx

\$6,599

(lease \$226/month)

*MS Office documentation on-line. Hard copy available for additional charge.

UPGRADES

Hard Drives

- 527MB 12ms IDE (from 420MB IDE)\$100
- 1.0GB 10ms SCSI-2 (from 527MB IDE) \$500
- 1.0GB 10ms SCSI-2 (from 527MB SCSI-2) \$300
- 2.0GB 9ms SCSI-2 (from 1.0GB SCSI-2) ..\$800
- 4.0GB 9ms SCSI-2 (from 2.0GB SCSI-2) \$1500

Tower Chassis (from desktop)\$100

All upgrades available with system purchase only.
Upgrades available within 30 days of system purchase only

Monitors

- Micron 15FGx (from 14G)\$150
- Micron 17FGx (from 15FGx)\$300
- NEC 21Multisync 6FGp (from 15FGx)
- 1280, .28, SVGA NI\$1700

Graphics Accelerators

- Diamond Stealth 64 2MB PCI . .call
- Matrox MGA-II 2MB PCIcall





Bill Howard

Sinking the *Sub* in Subnotebooks

Designing a subnotebook computer shouldn't be rocket science. Start with a decent 5- to 6-pound notebook computer and move the floppy disk drive outboard. But the examples I've seen have all been flawed in one way or another, so much so that the

sub in subnotebook seems to stand for suboptimal.

Subnotebook designers, in a race for the smallest footprint or the lightest weight, have taken too much out of their products. Here's what I believe should be in the perfect subnotebook computer:

- **Full-size keyboard.** Keyboards with key spacing and size shrunk 5 percent throw off your typing. For months, I've been trying to adjust to several keyboards smaller than 19mm, but I still find my typing stunted, especially when I'm tired, in a hurry, on a bouncing airplane, or balancing the computer on my lap. I don't believe I'm alone. Users least affected are hunt-and-peck typists, and their numbers grow fewer each year.

- **Actual four-hour battery life.** There's a real sense of freedom when you can get four or five working hours out of a battery, and it's different from being able to buy (and remember to carry) a spare two-hour battery. For the near term, I think the only battery technology that's going to give us this freedom is lithium ion, which isn't cheap.

- **Built-in modem.** I've written about this before. There's no need for an ungainly external modem dongle (adapter). What we need is either an internal modem or the Megahertz XJack PCMCIA modem (or one of the Megahertz wannabes), with built-in RJ11 jacks.

There are other subnotebook features that, I hope, are understood to be given at this stage of the game: dual-scan—or better—color backlit display, upper-end 486 power, minimum 200MB hard disk, one or two PCMCIA slots for everything but the modem, instant resume feature, standard serial and parallel

ports, a built-in pointing device, and an optional port replicator or docking station.

I'd be willing to trade screen size or system weight to get the other features. Surprisingly, I found a small screen (8.5 inches or less) has been relatively easy to get used to. Of course, I'd rather stare at a 9.5-inch screen, but size here isn't as much a problem as it is with keyboards.

I'm also not that worried about weight—4.5 pounds is as good as 4.0—because if you make the computer smaller, you'll be able to add more stuff to your carrying case and it'll still weigh 15 pounds.

Of the subnotebooks I've seen and used, Toshiba's Portege T3400CT and T3600CT (retrofitted with an XJack PCMCIA modem) come closest to perfection, primarily because of the fit and finish and the wondrous battery life. But the keyboard isn't regulation size, and even with recent price cuts these units are out of reach for many buyers. NEC's new Versa S fits the model of a subnotebook as a notebook with the floppy disk drive removed, but its battery life is poor: less than two hours. I hope NEC tries again with lithium ion. The Versa S could be a real winner.

Subnotebook computers have impact disproportionate to their sales because they're carried by so many influential users. Build the right subnotebook and you're perceived as a high-tech vendor. Also, over time, the external-floppy-disk subnotebook may become the mainstream portable if we can get decent file-transfer protocols built into the operating system (hello, Chicago), so users don't feel they have to carry a floppy disk to swap files.

Too many vendors are trying to think up replacement phrases for the term *subnotebook* when they should just be building better subnotebooks. □



It's not hard to build a decent subnotebook; you just have to concentrate on the right things.

H E W L E T T - P A C K A

HP Vectra VL2 PCs
HP quality in
value-priced PCs, from
\$1,049

HP Vectra N2 PCs
High-performance
network-ready
PCs in a slimline
package, from
\$1,429

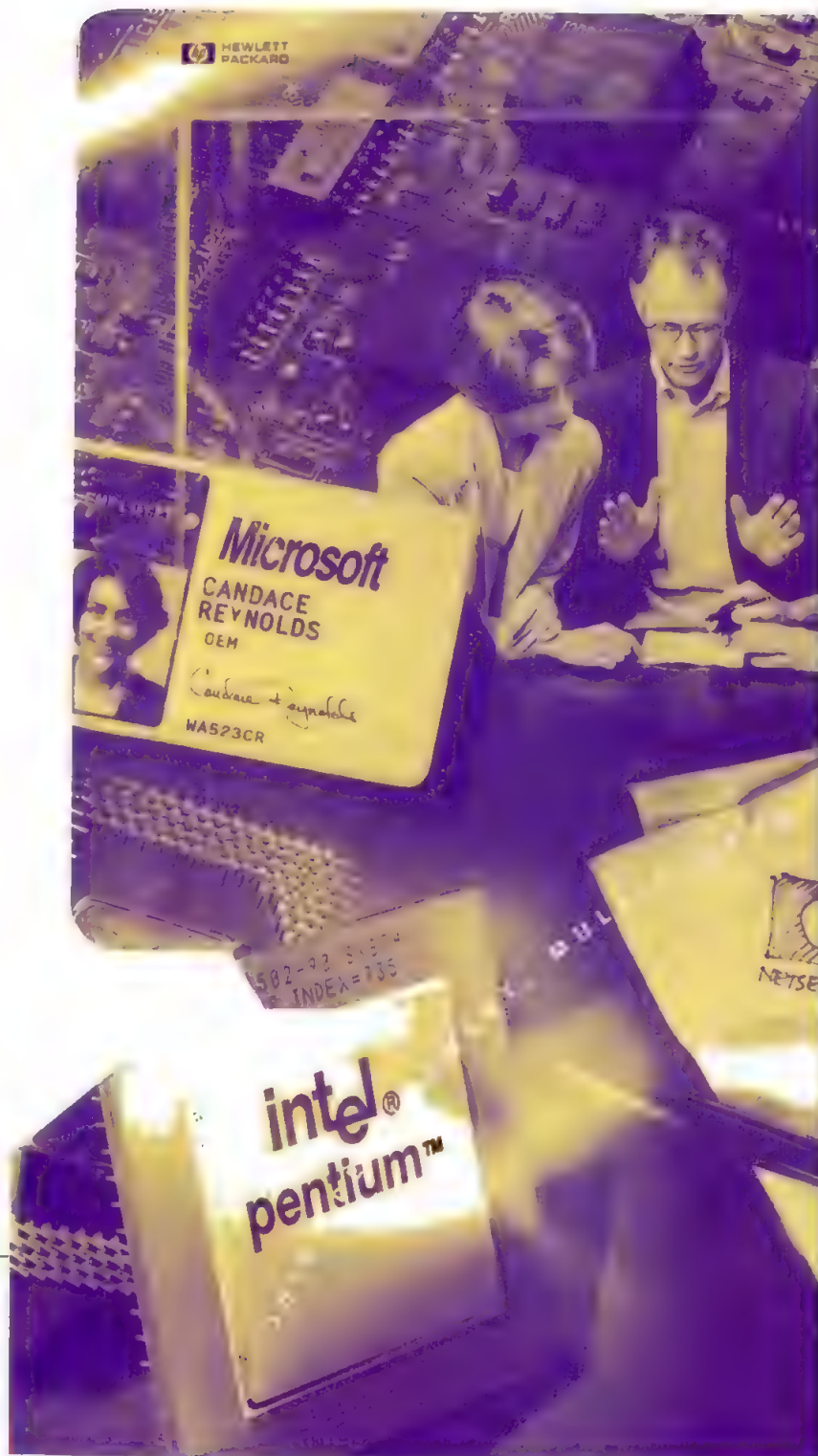
HP Vectra M2 PCs
High-performance
PCs for the connected
office, from
\$1,509

HP Vectra XM2 PCs
Exceptional 486
performance for
advanced business
use, from
\$2,069

HP Vectra XU PCs
The ultimate PCs
for advanced business
and technical
applications, from
\$3,749

HP Vectra Interactive PCs
Integrated multimedia
and communications
solutions for
business, from
\$1,559

HP offers a full 3-year
warranty on all PCs,
including 1-year on-site
and 2-year carry-in.*
For more information, call
1-800-322-HPPC, Ext. 8781.



R D P C s



You're looking at partnership in a whole new light.

If you have PCs on a network, hardware and software compatibility is undoubtedly one of your biggest concerns. You need to know who's talking to whom.

And you can start by talking to Hewlett-Packard. Together with partners like Intel, Microsoft®, Novell and others, we're developing technology that ensures true compatibility, across the board and across the network. So your PC runs everything it's supposed to, wherever it's supposed to.



Because if it
doesn't work in
your environ-
ment, it doesn't
work at all.



**HEWLETT®
PACKARD**

Six new ways into multimedia



1.

The logical way. The Sound Blaster™ Discovery CD™ 16 kit includes everything you need to explore the expanding universe of multimedia. And now it's more affordable than ever. You get a Sound Blaster 16-bit sound card, double-speed CD-ROM, stereo speakers, microphone and 15 cool software titles.
SRP, \$349.95



2.

The intelligent way. Sound Blaster Digital Schoolhouse™ is the antidote to mindless video games. It turns an ordinary PC into an awesome educational system that even makes math and spelling cool. Instead of chasing a brainless blip around the screen, kids travel through time to learn about their favorite dinosaurs. Or visit the rainforest or ancient China. Of course, since it's a Sound Blaster, you travel in style. You get a Sound Blaster 16-bit sound card, double-speed CD-ROM, plus 20 of the hottest educational software titles and more.
SRP, \$399.95



3.

The take-no-prisoners way. The most powerful forces of the gaming universe have come together. And now they're coming to get you. Game Blaster CD™ 16 brings together a Sound Blaster 16-bit sound card, double-speed CD-ROM, plus games to die for, like Rebel Assault and SIM City 2000. So be careful out there.
SRP, \$549.95

ys to blast timedia.



4.

The ultimate way. Educational software, games, cool creative software. The Sound Blaster Edutainment CD™ 16 gives you the whole enchilada. You get a Sound Blaster 16-bit sound card and double-speed CD-ROM. Not to mention over 40 of the planet's most captivating software titles and lots more.
SRP, \$599.95



6.

The bogus way. Sure, there are other ways to get into multimedia. But why take a chance? Sound Blaster sound cards and kits are the multimedia sound standard. All the hottest games and software are made to be played on Sound Blaster. Other systems don't seem as real or as cool. And neither do the people who play them.



5.

The inexpensive way. The Creative OmniCD™ 2x is the leanest, meanest CD-ROM upgrade in the cosmos. The 2x CD-ROM makes all your software more exhilarating. And it makes you more productive. With 6 cool software titles, you can dive into multimedia right out of the box.
SRP, \$249.95



Of course, all these kits give you 100% Sound Blaster compatibility. And all the technical help you need is just a phone call away. So installation is a no-brainer. Want more information on the mind-expanding world of multimedia? Just visit your nearest Creative Labs dealer. Or call 1-800-998-5227 Ext. 102.

CREATIVE
CREATIVE LABS, INC.

WAKE UP THE REST OF YOUR BRAIN

† Sound Blaster Discovery CD, Sound Blaster Edutainment CD, Game Blaster CD, Sound Blaster Digital Schoolhouse and the Sound Blaster 4holders. U.S. inquiries: 1-800-998-5227. International inquiries: Creative Technology Ltd., Singapore, TEL 65-773-0233 FAX 65-773-0353.

CIRCLE 084 ON READER SERVICE CARD

MULTIMEDIA UPGRADE KITS

Moving Up^{to} Multimedia

By John R. Quain

If you want to take advantage of the thousands of available multimedia software titles that mix graphics, sound, and video, it's time to bring that silent computer up to speed with a multimedia upgrade kit.

A surge in the number of games and CD-ROM titles over the past two years has fueled a corresponding surge in multimedia hardware sales. According to Info-Tech, a market research company in Woodstock, Vermont, there were 4,588 CD-ROM titles worldwide at the end of 1993; of these, 1,301 were multimedia titles.

Educational CD-ROMs filled with sound and video are making their way into homes and schools, and many nonmultimedia applications are being distributed on CD-ROM, including the forthcoming

Windows 4.0 (Chicago). As more new computers come with sound boards and CD-ROM drives standard, the term "multimedia PC" is becoming redundant.

If your PC is multimedia challenged, you needn't buy a whole new multimedia system to take advantage of the more than 1,300 multimedia CD-ROM titles on the market. You can go out and buy a CD-ROM drive and sound card separately, or you can purchase them together as a multimedia upgrade kit. Multimedia upgrade kits, which are sold by PC vendors, sound-card vendors, and CD-ROM drive vendors, consist of a

► IN THIS REVIEW

<i>ACS/KRIS Compro Multimedia Upgrade Kit</i>135	<i>Media Vision Premium Deluxe Multimedia Kit</i>146
<i>Aztech Sound Galaxy Voyager</i>135	<i>Megamedia SS20</i>151
<i>Creative Labs Game Blaster CD 16</i>136	<i>Ocean Vienna</i>151
<i>Creative Labs Sound Blaster Digital Edge 3X</i>136	<i>Plexor 4PLex Sound Chaser</i>152
<i>Creative Labs Sound Blaster Edutainment CD 16</i>136	<i>Reveal Quantum</i>152
<i>Identity IDC DKIT1</i>138	<i>Sigma Designs ReelMagic CD-ROM Upgrade Kit</i>154
<i>MediaMagic DSP-16 Sound System</i>138	<i>Toptek Multimedia Advanced Upgrade Kit</i>154
<i>Media Vision Super Deluxe Multimedia Kit</i>146	<i>Turtle Beach MultiSound Monterey Kit</i>157
	<i>Performance Tests</i>116
	<i>Do MPC Systems Measure Up</i> ..126
	<i>Summary of Features</i>142



Multimedia Upgrade Kits

CD-ROM drive and sound card and often include headphones, powered speakers, a microphone, and multimedia CDs.

There are two advantages to buying a multimedia upgrade kit rather than individual components: First, the vendor has already made sure that the components work together, and anyone who has tried to install multimedia hardware knows it's not easy. Second, purchasing multimedia components as a kit saves money. Creative Labs' Game Blaster CD 16, for example, which costs about \$429 in stores,

comes with a Sound Blaster 16 Basic Edition sound board, a double-speed CD-ROM drive, Labtec CT-38 speakers, a microphone, and 16 CD-ROM titles. A comparable system purchased separately would cost about \$100 more.

According to research firm Dataquest, 1.3 million multimedia kits were sold last year; that number is expected to hold steady for 1994 as more people forgo upgrade kits in favor of new multimedia-ready PCs. In this roundup, you'll find 16 multimedia upgrade kits designed to

serve a variety of needs, from games and education to serious MIDI (Musical Instrument Digital Interface) work and multimedia authoring. These kits, offered by 13 different vendors, cover most budgets, with list prices ranging from \$340 to \$999. In the sidebar "Do MPC Systems Measure Up?" we also look at four of the best-selling multimedia PCs, which come with preinstalled CD-ROM drives and sound cards, to see how they compare to kits in features and performance.

H I G H L I G H T S

Multimedia Upgrade Kits

IS IT TIME to go multimedia? Sales of multimedia upgrade kits and multimedia-ready PCs are soaring, driven largely by an array of excellent "edutainment" CDs geared to the multimedia-equipped. From reference works to educational material to games, the combination of sound and vision is alluring and addictive. Serious business uses, such as multimedia presentations and voice annotation, are also making their way to the mainstream.

SHOULD YOU BUY a kit or separate components? There are pros and cons to each. Going it alone lets you mix and match the best components but entails worry over compatibility. Buying a kit eliminates that nightmare. A bundle can also save you money; it typically costs \$100 less than components purchased separately and often delivers a slew of free CD titles.

UNFORTUNATELY, we found that the speakers that come with most of these kits tend to be poor. The exception is Reveal Computer Products' Quantum kit, which includes a pair of 40-watt-per-channel speakers with good sound. Plextor, with its 4PLex Sound Chaser, and Turtle Beach Systems, with its MultiSound Monterey Multimedia Upgrade Kit, do not include speakers on the assumption that you'll want to choose your own.

INSTALLATION HEADACHES still persist, but we were generally impressed by the ease with which we got the kits up and running. We ran into some snags with kits from ACS/KRIS Technologies, Aztech Labs, and MediaMagic that might confound novice users, but installing the others proved relatively painless.

CONSIDERATIONS ABOUND when you're trying to pick the kit that's right for you. Look closely at the performance of the CD-ROM drive you'll be getting: Double-speed drives may be fine for now, but eventually you may want something better—like the triple-speed NEC MultiSpin 3Xi that comes with the Creative Labs Sound Blaster Digital Edge 3X or the quadruple-speed Plextor PX-43CH in the Plextor Sound Chaser. Sound quality, too, varies widely. Most of the sound boards were fine for playing prerecorded CDs, but multimedia authors and MIDI users should look closely at a board's recording and playback performance. Here, only the high-end Turtle Beach Monterey Kit excels.

MIDI COMPOSERS should make sure that the sound card comes with wavetable synthesis instead of the inferior FM-synthesized sounds. If wavetable synthesis is not included, check whether it is a costly option or not an option at all.

REVIEW CRITERIA

For this roundup, *PC Magazine* requested kits that meet the Multimedia PC Marketing Council's MPC Level 2 specification. To do this, a multimedia package must include a sound board capable of recording and playing back 16-bit, 44.1-kHz stereo sound samples and playing MIDI files. To qualify for the MPC Level 2 specification, kits must also include a double-speed (at least) CD-ROM drive capable of an average data-transfer rate of 300 kilobytes per second using no more than 60 percent of the CPU's power. We requested one kit from each vendor except the market leaders, from which we accepted up to three.

Kits from Wearnes Technology Corp. and IBM Corp. were not shipping at the time of our review. Procom Technology, Cardinal Technologies, and Saturn Technology did not send us products in time for testing. ATI Technologies' CD Sound Dimension kit was not MPC 2-compliant. Two of the kits we reviewed came from Media Vision. A leader in the multimedia kit arena, Media Vision has been seriously shaken by allegations that it has been reporting false financial data. In July 1994, the company filed for Chapter 11 bankruptcy protection; at the time of this writing, its future was in doubt.

To judge MPC compliance and performance, ZD Labs tested the sound boards using the same equipment used to test home-stereo equipment—the Audio Precision System One analyzer. We also ran subjective tests by listening to the sound cards connected to the speakers included in their kits, and then to Altec Lansing ACS 300 speakers. Since the Altec Lansing speakers (\$350 list, \$300 street) provide much better sound quality than the average set of powered speakers included

with a kit, they gave us a better idea of the capabilities of the sound cards.

We conducted CD-ROM evaluations using two tests: *PC Magazine's* 16K Sequential Read test, to determine average throughput; and Microsoft's MultiMedia Pack VidTest, to measure CPU utilization and the number of dropped video frames and audio segments during playback of AVI (audio video interleaved) files. In addition, ZD Labs introduced a new test suite for speakers. We used the Audio Precision analyzer and a Bruel & Kjaer Type 4133 microphone to test each pair of speakers for maximum output (loudness at 10 percent distortion), frequency response, and total harmonic distortion.

WHAT WE FOUND

In judging the performance of the multimedia kits, there are several test results you should note. First, *PC Magazine's* tests show that you should regard advertisements touting "CD-quality sound" with skepticism. So-called 16-bit sound cards do use the same digital sampling size (16 bits) and rate (44.1 kHz) as those used for music-CD recordings. Test results show, however, that even the sound of the most carefully designed card cannot match the high-fidelity sound produced by a quality home-stereo CD player. The only exception: Turtle Beach Systems' MultiSound Monterey Multimedia Upgrade Kit turned in performance that most closely approximates that offered by home-stereo components.

Several factors prevented the other kits in this roundup from achieving CD-quality sound. Inferior amplifiers added noise, inexpensive filters failed to quell distortion, and poor analog-to-digital converters (ADCs) and digital-to-analog converters (DACs) created digital errors that adversely affected sound quality. ZD Labs tests also found three sound boards—Identity Systems Technology's CHIC, the custom 16-bit Media Vision board included in the Media Vision Super Deluxe, and Tiptek Technology's Gold-



Education, games, and business:

• Reveal Quantum

Multimedia authoring and MIDI:

• Turtle Beach MultiSound Monterey Multimedia Upgrade Kit

Most of the 16 multimedia kits we looked at were acceptable but lacking in one way or another—be it in terms of sound quality, ease of installation, or cost.

You could buy all the ingredients for an entry-level multimedia package for somewhere from \$350 to \$450: \$150 (street price) for a CD-ROM drive, \$100 for a 16-bit sound board (or \$200 for a wavetable version), \$100 for decent speakers. Three entry-level kits deserve honorable mention, delivering quality components and good selections of family CD titles at reasonable prices: ACS/KRIS Technologies' Compro Multimedia Upgrade Kit (\$340 list), Creative Labs' Game Blaster CD 16 (\$429 street), and Creative Labs' Sound Blaster Edutainment CD 16 (\$449 street). Unfortunately, the Compro's installation is too tricky for most entry-level users. At \$249, wavetable options for the Creative Labs products make upgrading more expensive than with most other kits.

So our Editors' Choices this time are restricted to midprice and high-end kits. If you need a kit for both games and edutainment as well as business we recommend Quantum, from Reveal Computer Products (\$599 street), which bundles quality components. The included Ensoniq Soundscape wavetable synthesis is among the best on the market, and the 40-watt-per-channel speakers offer

good bass response and plenty of punch. One caveat, however: We found the board's performance to be unacceptable for recording and playing back your own digital audio, so multimedia authors will have to look elsewhere.

Here's elsewhere: The MultiSound Monterey Multimedia Upgrade Kit, from Turtle Beach Systems, delivers unparalleled sound quality for professional multimedia and MIDI work. The \$799 price buys you the Editors' Choice-winning Sony CDU-33A CD-ROM drive and Turtle Beach's MultiSound Monterey sound card, featuring the company's unique DSP and good wavetable synthesizer (you must buy your own speakers and microphone).

Sigma Designs deserves recognition for its ReelMagic CD-ROM Upgrade Kit. Its unique MPEG decompression lets you play full-screen, full-motion video on your PC. Look for other manufacturers to follow Sigma Designs' lead.

Once installed, the remaining products offer at least adequate sound and performance, with the exception of kits from Identity Systems, MegaMedia Corp., Ocean Information Systems, and Tiptek Technology.

en Sound Pro 16 Plus—that had switched the left and right stereo channels.

If you plan to use today's state-of-the-art multimedia CDs, you need a fast CD-

ROM drive. All the models we tested met the MPC 2 specification by staying within 2 percent of the required average data-transfer rate of 300 KBps. To be sure your kit's drive will play back demanding video clips smoothly, check the results of the custom AVI file portion of our Multimedia Playback tests. On this section, all but three of the drives dropped video frames during playback, making moving images

Our Contributors: JOHN R. QUAIN is a contributing editor to *PC Magazine*. BEN MILLER is a project leader, ROB SCHENK is a technical specialist, and DAVE SALVATOR is an associate project leader at Ziff-Davis Labs. MICHAEL J. ZULICH is a project leader at *PC Magazine*. LEON ERLANGER was the associate editor in charge of the story, and JAE YANG was the project leader.

We divided the testing of multimedia upgrade kits and MPC systems into three sets to reflect the major multimedia components: sound boards, CD-ROM drives, and speakers. CD-ROM drive performance was adequate for multimedia chores, with a couple of notable standouts. Sound board performance was somewhat spottier, and speaker performance was generally poor.

Sorting out which kits are recommendable and which aren't is difficult because the combination of components creates a matrix of considerations. An excellent drive may be bundled with a sound board that is merely acceptable, so you'll have to determine what your primary use will be and weight your decision accordingly. We did find several packages that performed satisfactorily or better on our sound board and CD-ROM tests: ACS/KRIS Technologies' Compro Multimedia Upgrade Kit, Creative Labs' Game Blaster CD 16 and Sound Blaster Edutainment CD 16, Media Vision's Super Deluxe Multimedia Kit, Reveal Computer Products' Quantum, Sigma Designs' ReelMagic

CD-ROM Upgrade Kit, and Turtle Beach's MultiSound Monterey Multimedia Upgrade Kit. Only the Identity Systems Technology's IDCCKIT1, Megamedia Computer Corp.'s Megamedia SS20, Ocean Information Systems' Vienna, and Tiptek Technology's Multimedia Advanced Upgrade Kit performed poorly in so many tests that we considered them unacceptable.

CD-ROM Drives

WHAT THE NUMBERS MEAN

The results of the 16K-block Sequential Read test show that all of the drives approached their rated throughput speeds of 300 kilobytes per second for double-speed drives, 450 KBps for

triple-speed, and 600 KBps for quadruple-speed drives.

The Multimedia Playback tests more fully stress the complete CD-ROM subsystem (CD-ROM drive, interface, and controller chip) than does the Sequential Read test. The best overall performers, as could be expected, were the triple- and quadruple-speed drives. Neither the Sound Blaster Digital Edge 3X's NEC MultiSpin 3X, nor the Plextor PX-43CH dropped any video frames in any test, and both subsystems maintained extremely low CPU utilization across all the file types. The triple-speed NEC MultiSpin 3Xi and motherboard controller combination in the NEC multimedia PC system performed just as well as its high-speed competition on all but the custom AVI file. Here it dropped a meager 2 video frames, and its CPU utilization ran a very low 22 percent. The double-speed NEC CDR260 drive that came with the Gateway 2000 P4D-66 multimedia PC almost matched the quadruple-speed drive on the custom AVI file, where it dropped zero frames on every test and had a CPU utilization of 36 percent.

Audio Performance: A Glossary

Frequency response indicates how well a board or speakers reproduce sounds ranging from deep bass to high treble. Ideally, the component should handle all frequencies from 20 Hz to 20,000 Hz uniformly. Such a frequency response curve, when plotted, would yield a straight line at 0 dBr (decibels, relative) or at 80 dBspl (decibels, sound-pressure level) in this spectrum. For sound boards, however, a 2 dB or so dropoff can be expected at 18,000 Hz because of the sharp treble cutoff filter. The smaller the deviation from 0 dBr or from 80 dBspl in this range, the better the sound reproduction. A level below -3dBr for sound boards or 70 dBspl for speakers is unacceptable.

The **signal-to-noise ratio** (S/N ratio) is the ratio, in decibels, of the maximum undistorted output of the board (the signal) and the inevitable electronic noise—mostly hum and hiss—generated by the board's own circuitry. At the background level

where such noise occurs, the human ear does not perceive all frequencies equally. So a standardized *A-weighting* network has been developed to reflect the "perceptible annoyance" value of electronic noise. On the tables we report this A-weighted signal-to-noise ratio. The larger the number, the better (quieter) the board. Note that a score below 75 dBr means that background hum and hiss will underlie the sound being reproduced and may become audible during silent passages.

With digital sound equipment, **quantization noise** serves as a more accurate guide to residual noise than the usual S/N figures do. Quantization noise is caused by the imperfect signal conversion from analog to digital or from digital to analog. It is measured in the presence of a signal and is reported as the number of decibels below the maximum signal. The lower the score (the larger the negative number), the better the sound quality.

In addition to noise, distortion is a problem. The integrated circuit amplifiers of audio components generate unwanted harmonics that alter the timbre of the music signals passed through them. The **total harmonic distortion plus noise** (THD+N) is the total of all spurious harmonic frequencies (plus the noise) generated within the board; it is expressed as a percentage of the undistorted output signal strength. THD+N values that exceed 0.1 percent are likely to be audible; they indicate that the component has less than optimal circuitry.

Channel separation is the degree to which left- and right-channel signals remain distinct from one another. Ideally, channel separation (on which stereo effect depends) should be infinite, so that no signal whatsoever leaks from one channel into the other. Imperfections in excess of -50 dBr (such as -45 dBr) are likely to mask the beneficial effects of stereo imaging.

THE 170MB COMPAQ CONTURA AERO AT \$1,199.



Take Two, They're Small.

**CONTURA AERO
FEATURES**
ONLY 3.5 LBS.
486SX/75 PROCESSOR
4MB RAM
(EXPANDABLE TO 12MB)
170MB HARD DRIVE
PCMCIA TYPE II SLOT
8" MONOCHROME
BACKLIT VGA DISPLAY
INTEGRATED COMPAQ
EASYPOINT TRACKBALL
NIMH BATTERY PACK
AND AC ADAPTER
WINLINK FILE TRANSFER
UTILITY WITH CABLE
PREINSTALLED MS-DOS®
MS-WINDOWS®, TABWORKS®,
LOTUS ORGANIZER
1-YEAR PICK-UP
WARRANTY*
COLOR UNITS AVAILABLE
CALL FOR INFORMATION

The Compaq Contura® Aero™ is everything a great 486 ultra portable notebook should

CONTURA AERO OPTION PACK
PCMCIA 2400/9600 DATA + FAX MODEM
3.5" EXTERNAL FLOPPY DISK DRIVE
ENHANCED NIMH BATTERY PACK
BACKPACK OR CARRYING CASE
ADD \$259

be. First of all, it's quite small. Only 10.25" wide, 7.5" deep, and 1.5" high. And you'll find it's also very light, a mere 3.5 lbs.

But most importantly, the Contura Aero is an incredibly full-featured and useful working tool. It comes with 4MB RAM, an 8" monochrome back-

lit VGA display, integrated trackball, preinstalled software and more.

For added flexibility, consider the Contura Aero Option Pack™. You'll get an additional battery pack, an external floppy disk drive, a PCMCIA data+fax modem, and a carrying case or backpack.

At last. A quality subnotebook with a price proportional to its size.

**CONTURA AERO
UPGRADES & OPTIONS**
ADDITIONAL
4MB RAM (8MB TOTAL)
ADD \$245
CONVENIENCE BASE
ADD \$99
3.5" EXTERNAL
FLOPPY DISK DRIVE
ADD \$99
CANON BJ FINE
BUBBLE JET PRINTER
ADD \$269

COMPAQ
DirectPlus



ASK FOR OUR NEW
FREE CATALOG

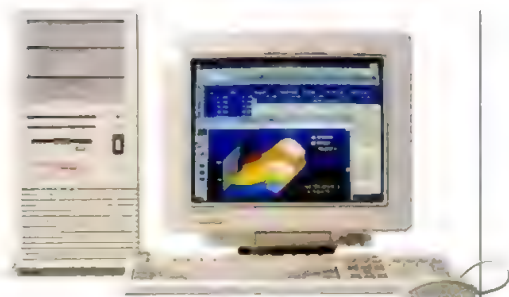
1-800-888-0174

WEEKDAYS 7-7, SAT. 10-4 CST



*Price good only with purchase of Contura Aero purchased through Compaq DirectPlus. †Restrictions and exclusions apply. Compaq Aero is covered by a Three-Year Pick-Up Warranty. Monitors, battery packs and certain options are covered by a One-Year Warranty. © 1994 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. DirectPlus is a registered service mark of Compaq Computer Corporation. Aero is a trademark and Option Pack is a service mark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks and Windows is a trademark of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. The Intel Logo is a registered trademark of Intel Corporation. Offer available in the U.S. only.

YOU'RE LOOKING AT THE PRICE, PERFORMANCE



Compaq ProLinea™ MT 4/33S

\$1,529

Or \$54
per month*

Minitower case with EasyAccess™ side panel has five expansion slots and five drive bays for superior expandability. It's easy to add options like a data+fax modem, a tape backup drive, or CD-ROM drive. And it's upgradable to Pentium™ technology.

ProLinea MT Features:

33MHz 486SX Processor
(other processors available)
◆
4MB RAM (upgradable to 64MB)
◆
420MB Hard Drive
◆
3.5" Diskette Drive
◆
Local Bus Graphics with 1MB VRAM
◆
14" SVGA Color Monitor (1024 x 768)
◆
Preinstalled MS-DOS® 6,
MS-Windows™ 3.1, and TabWorks

**Preinstalled Multimedia
Solution Paq available.**



Compaq ProLinea 4/33S

\$1,349

Or \$48
per month*

Multimedia Solution Paq™

With SoundBlaster 16-bit sound board, internal dual-speed CD-ROM drive, external stereo speakers, microphone & multimedia software. Starts at \$449.

ProLinea 4/33S Features:

33MHz 486SX Processor
(upgradable to Pentium technology)
◆
4MB RAM (upgradable to 100MB)
◆
270MB Hard Drive
◆
3.5" Diskette Drive
◆
Local Bus Graphics with 1MB VRAM
◆
14" SVGA Color Monitor (1024 x 768)
◆
Preinstalled MS-DOS 6,
MS-Windows 3.1, and TabWorks.

**Preinstalled Multimedia
Solution Paq available.**



Compaq Deskpro™ XE 4/66

\$2,249

Or \$80
per month*

You couldn't ask for more in a business PC. From powerful processors to QVision™ Local Bus Graphics and enhanced audio, it offers some of today's latest technology.

Deskpro XE Features:

66MHz 486DX2 Processor
(others available, including Pentium)
◆
8MB RAM (upgradable to 32MB)
◆
270MB Hard Drive
◆
3.5" Diskette Drive
◆
QVision Local Bus Graphics
with 1MB VRAM
◆
14" SVGA Color Monitor (1024 x 768)
◆
Enhanced audio capabilities
and Microphone
◆
Preinstalled MS-DOS 6,
MS-Windows 3.1, MS-Windows
Sound System software and TabWorks



*Leasing is provided by GE Capital Services for a term of 36 months and is subject to approved credit and certain terms and conditions. Call for details. Restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a One Year Warranty. Compaq Contura Aero and Concerto are covered by a 3-Year Pick Up Warranty. ©1994 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. Contura is a registered trademark, Direct-Plus is a registered service mark, Concerto, ProLinea, Aero, QVision, Deskpro, EasyPoint and EasyAccess are trademarks, and Solution Paq is a service mark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks, and Windows is a trademark of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. The Intel Inside Logo is a registered trademark and Pentium is a trademark of Intel Corporation. Offer available in the U.S. only.

**The
Compaq
3-Year
Warranty!**

DELICATE BALANCE OF SELECTION AND VALUE.



Compaq Contura®

Color

\$1,949

Or \$69
per month*

An affordable notebook with the power and expandability for demanding business applications, and support for communications options. Power management features extend battery life, and security features protect data.

Contura Features:

25MHz 486SL (DX) Processor
4MB RAM (upgradable to 20MB)

120MB Hard Drive
(209MB available)

3.5" Diskette Drive

9.5" Color Advanced
Passive VGA Display

Compaq Trackball

Battery & AC Adapter

Only 6.2 lbs.

Preinstalled
MS-DOS 6, MS-Windows 3.1,
and TabWorks



Compaq Contura Aero™

Aero Features:

Only 3.5 lbs.
and 10.25" x 7.5" x 1.5"

25MHz 486SX Processor
4MB RAM (upgradable to 12MB)

170MB Hard Drive

8" Monochrome Backlit VGA Display

Integrated Compaq
EasyPoint™ Trackball

PCMCIA Type II slot

NiMH Battery & AC Adapter

Preinstalled
MS-DOS 6, MS-Windows 3.1,
and TabWorks

Weighing
in at a mere
3.5 lbs., the
Contura

\$1,199

Or \$43
per month*

Aero makes the perfect traveling companion. Though lightweight, it's packed with features you'd never expect in a PC this small, including a 486 processor that can handle a range of applications, a PCMCIA Type II slot for accessories, as well as an integrated Compaq trackball that allows for comfortable use out on the road.

COMPAQ
DirectPlus



1-800-888-0194

Weekdays 7-7, Sat. 10-4 CST

Ask for our new free catalog.

Across the board, subsystems that used true SCSI support (Creative Labs' Sound Blaster Digital Edge 3X, Media Vision's Premium Deluxe and Super Deluxe kits, Plexor's 4PLex Sound Chaser, and Tiptek's Multimedia

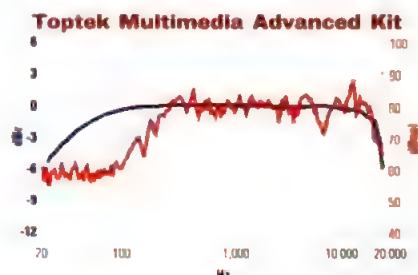
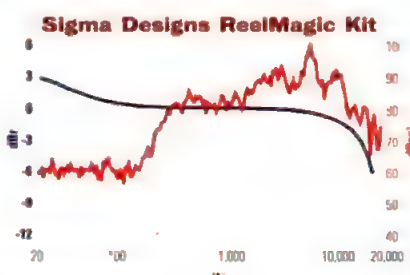
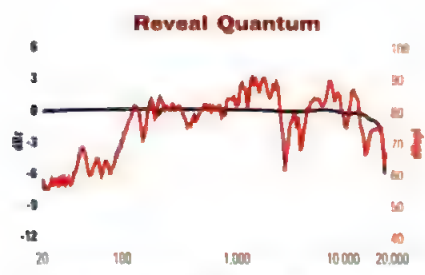
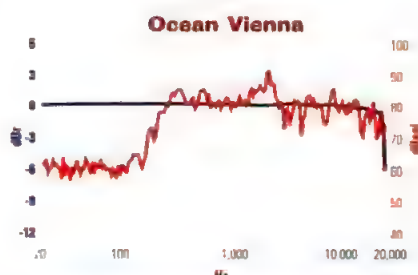
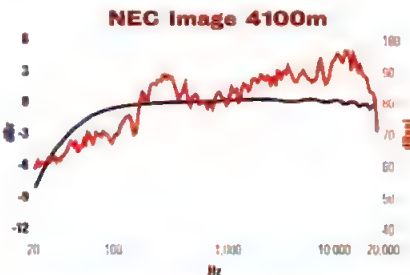
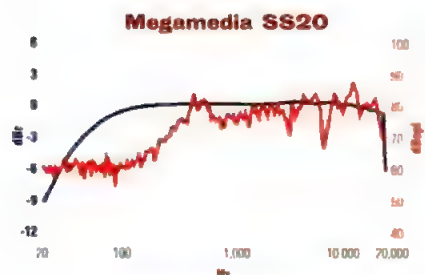
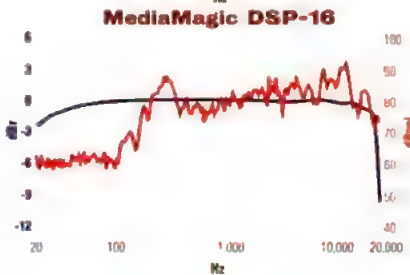
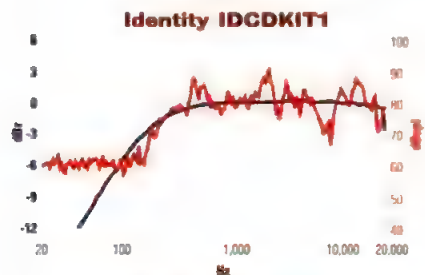
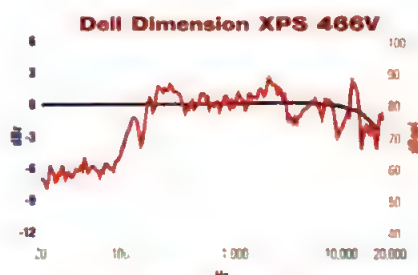
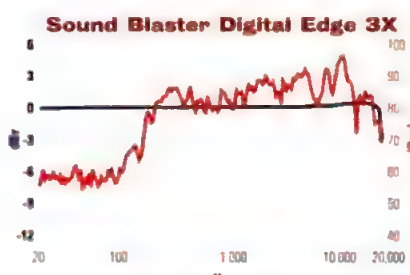
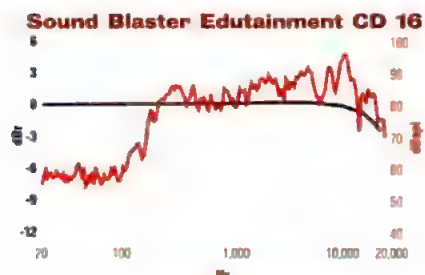
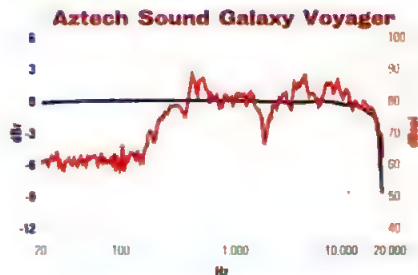
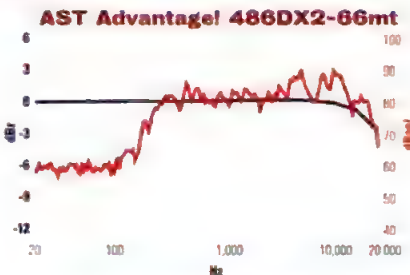
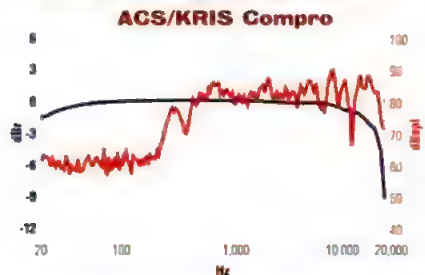
Advanced Upgrade Kit) yielded better results, with one exception: The Megamedia SS20 subsystem, which uses a Zilog 5380 SCSI controller chip, was a consistently poor performer: It dropped 221 video frames on our custom AVI

file while maintaining 92 percent CPU utilization.

Additionally, the Identity IDCD-KIT1 subsystem, which has a proprietary NCR controller chip, turned in poor performance, dropping 210 video

SOUND BOARDS AND SPEAKERS: FREQUENCY RESPONSE

■ Sound boards (digital playback) ■ Speakers



Note: An ideal frequency response curve yields straight lines at 0 dB (sound boards) and 80 dB (speakers) in this spectrum.

frames but keeping CPU utilization down to 48 percent. The Mitsumi-based subsystem in Ocean Information Systems' Vienna ran equally poorly, dropping 210 video frames though using an acceptable 58 percent of the CPU.

HOW WE TESTED

Our Microsoft Windows-based, low-level **CD-ROM Drives: Sequential Read** test measures the raw sequential data-transfer speeds of the CD-ROM subsystems. Applications read data off the disk using several different block sizes; 512 byte, 2K, 4K, 8K and 16K blocks are common. Here, we show the results for 16K blocks; this represents the drive's optimal data-transfer rate.

Our **CD-ROM Drives: Multimedia Playback** tests show the number of video frames dropped, the number of audio breaks, and the percentage of CPU utilization when playing back multimedia files.

Microsoft Corp. gave us permission to use its VidTest, a Windows-based digital-video performance test program that can measure the number of dropped video frames and audio segments during playback of AVI files. Its Data Streaming test also measures CPU utilization attributable to the CD-ROM subsystem. VidTest uses Microsoft Video for Windows drivers and is distributed on the Microsoft Multimedia Pack. Though it has become a de facto industry standard, VidTest is not currently endorsed by the Multimedia PC Marketing Council (MPC).

We used VidTest to play four different AVI files, compressed with either Microsoft's Video 1 compression scheme or Intel's Indeo compression technology. The first three files contain 15-fps (frame-per-second), 160-by-120-pixel video at 8-, 16-, and 24-bit color depths. These 160-by-120 files are designed to play satisfactorily on 150-kilobyte-per-second, single-speed drives. Our final custom AVI file—a 320-by-240, 8-bit clip—was geared to run with 300-Kbps double-speed drives. When playing these files, we set audio playback to have a higher priority than video. A few missed video frames are less discernible than a break in audio continuity.

For these tests our platform was a 486DX2/66-based EISA/VL-bus unit from Micron Computer. Each system had 256K of L2 cache, 8MB of RAM, and a Diamond Viper VLB video adapter based on Weitek's P9000 accelerator chip. Tests were conducted at 800-by-600 resolution in 24-bit color. The CD-R disk containing our custom AVI file was produced on a Pinnacle Micro RCD-202 recorder.

Sound Boards

WHAT THE NUMBERS MEAN

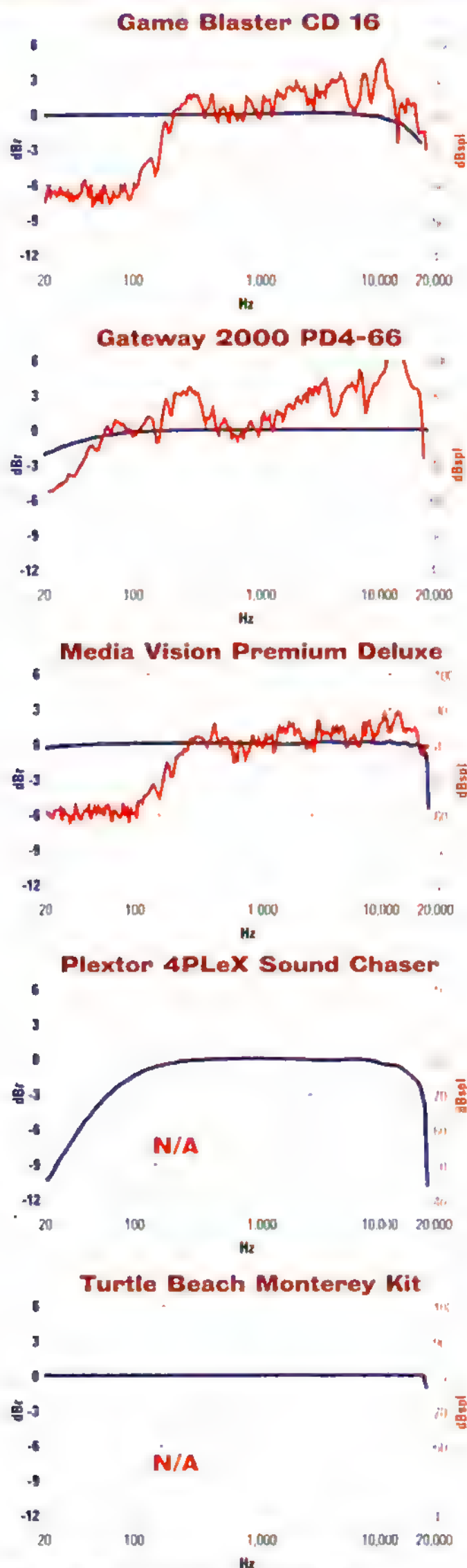
We defined four tiers of sound quality among the tested boards. The top tier contains only one board: Turtle Beach's MultiSound Monterey. This was the only board that gave sound quality

equivalent to what you would get from an audio CD player. We define that as a perfectly flat frequency response from 20 Hz to 20,000 Hz, a signal-to-noise (S/N) ratio above 75 dBr (decibels, relative) at 1 volt, total harmonic distortion plus noise (THD+N) less than 0.1 percent, quantization noise lower than -70 dBr, and channel separation greater than -75 dBr.

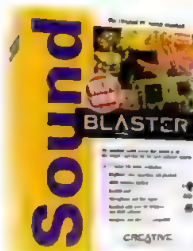
The second tier consists of sound boards that give a reasonably clean sound, with highs and lows good enough for playing multimedia CD titles or for recording music or voice clips. We define it as having a frequency response that ranges from 40 Hz to 18,000 Hz while staying above the -3 dBr level, an S/N ratio above 65 dBr (between 65 dBr and 75 dBr, humm and hiss are audible but not disturbing), and a THD+N not too far above 0.1 percent.

The boards that fall into this category are the Futura 16 in the ACS/KRIS Compro kit; the Sound Blaster 16 Basic Edition cards found in the Game Blaster CD 16 and Sound Blaster Entertainment CD 16 kits from Creative Labs; the DSP-16 in MediaMagic's DSP-16 Sound System; the custom 16-bit Media Vision sound board in the Super Deluxe Multimedia Kit; and the cards in the AST, Dell, and Gateway MPC systems we looked at.

Boards in the third tier either showed a weakness on one or two of our tests or were below average all around (though still acceptable for some multimedia applications, such as games). These were the Sound Galaxy Nova 16 in the Aztech Labs kit, which had poor quantization (-54.8 dBr) and THD+N (0.229 percent) scores on the Digital Playback tests; the Sound Blaster SCSI-2 in Creative Labs' Sound Blaster Digital Edge 3X, whose frequency response above -3 dBr started at 45 Hz on the Digital Recording and Playback tests; the Premium 3-D sound card in Media Vision's Premium Deluxe kit, which had poor THD+N (0.551 percent) on the Digital Recording and Playback tests and poor channel separation (-52.7 dBr); and the Sound-FX Wave 32 in Reveal's Quantum,



N/A - Not applicable. The product does not come with speakers.



Sound Blaster
Value Edition
SRP, \$69.95

The sound decision.

With hundreds of today's hottest titles written for Sound Blaster™ cards, there are so many tough decisions. Like which game to buy? Will it be the thunderous explosions in Rebel Assault, or the eerie howling of 7th Guest? Either way, you'll hear new sounds that were in your programs all along. The Sound Blaster Value Edition card is the most economical way to introduce yourself to the fun and games of sound. It's an 8-bit sound board that adds impact to thousands of applications and comes with several Windows-based sound utilities.

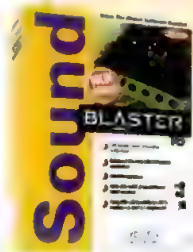


Sound Blaster Pro
Value Edition
SRP, \$105.95

The smart decision.

Games are not the only software designed for Sound Blaster cards. Imagine a math program with a vast array of sound effects. Or picture 15th century England where you venture into a whole world that looks, feels and sounds authentic. It's mesmerizing. It's hypnotic. Especially if you have the Sound Blaster Pro Value Edition, the 8-bit sound card with stereo sound. It's compatible with Creative Labs CD-ROM drives, and comes with innovative sound utilities and recording software.

Tough decisions. Choose one Sound Blaster or buy 5 more.



Sound Blaster 16
Value Edition
SRP, \$139.95

The 16-bit decision.

Stepping up to 16-bit sound means exploring a world of realistic sound. The Sound Blaster 16 Value Edition is the best-selling sound card ever. It's the affordable way to add true 16-bit CD-quality audio to business, multimedia and home applications that meet MPC2 standards. It includes a built-in CD-ROM interface for Creative Labs CD-ROM drives and a free library of utilities. And after experiencing a 16-bit game on Sound Blaster, you'll bolt to a nearby window, stick your reverberating head outside, and start screaming like a banshee, "I WANT 16-BIT SOUND!"



Of course, all Sound Blaster cards are easy to install and give you 100% compatibility with all software written for the Sound Blaster au



Sound Blaster
16 MultiCD
SRP, \$199.95

with Advanced
Signal Processor
SRP, \$249.95

The freedom decision.

How do you single out a great sound card without cramping your freedom of choice? Get a Sound Blaster 16 MultiCD™ and you can connect a CD-ROM drive from manufacturers such as Sony, Mitsumi, and of course, Creative Labs. This 16-bit card leaves you the option of upgrading to Wave Blaster or Advanced Signal Processor, the advanced technologies for MIDI music and more demanding sound-enhanced programs. And with VoiceAssist software, you can command programs with your voice.



Sound Blaster
16 SCSI-2
SRP, \$249.95

with Advanced
Signal Processor
SRP, \$299.95

Decision. Sound Blaster the computers?

The power decision.

Sound Blaster 16 SCSI-2™ gives you the best of everything and compromises nothing. It's 16-bit CD-quality stereo sound with an optional Advanced Signal Processor and a collection of sound utilities. You can connect your sound card and up to six SCSI devices to a single port. Hook up your CD-ROM drive, hard drives, tape drive, and Syquest. This high-performance card is a must for the hardcore sound aficionado.



Sound Blaster AWE32
SRP, \$399.95

The next wave decision.

The next generation of games will come at you with sound so real, you'll have to hang on to your headphones. Only Sound Blaster AWE32™ can deliver the ultimate CD-quality sound experience! Real instrument sounds, real life sound samples, real sound effects. It's a 16-bit card with Advanced Signal Processor and Advanced WaveEffects™, which replaces synthesized sounds with real sound samples. And other cool stuff. Like QSound, a state-of-the-art technology that surrounds your ears with a 180° soundscape of intense virtual audio. Get a Sound Blaster AWE32 and get it all.

orm. Make your decision and visit your nearest Creative Labs dealer. Or call 1-800-998-5227 Ext. 111

CREATIVE
CREATIVE LABS, INC.

CIRCLE 086 ON READER SERVICE CARD

CD-ROM DRIVES: MULTIMEDIA PLAYBACK

	Video 1 Compression (8-bit) (8-bit, 930 frames, 160-by-120 resolution)			Video 1 Compression (16-bit) (16-bit, 930 frames, 160-by-120 resolution)			Intel Indeo Video Compression (24-bit, 930 frames, 160-by-120 resolution)			Custom AVI file (8-bit, 225 frames, 320-by-240 resolution)		
	Number of video frames dropped	Number of audio breaks	CPU utilization (percent) ▼	Number of video frames dropped	Number of audio breaks	CPU utilization (percent) ▼	Number of video frames dropped	Number of audio breaks	CPU utilization (percent) ▼	Number of video frames dropped	Number of audio breaks	CPU utilization (percent) ▼
ACS/KRIS Compro Multimedia Upgrade Kit	0	0	26	0	0	26	0	0	26	103	0	61
AST Advantage! Adventure 486DX2-66mt	0	0	37	0	0	38	0	0	37	136	0	83
Artich Sound Galaxy Voyager	0	0	28	0	0	27	0	0	26	79	0	46
Creative Labs Game Blaster CD 16	0	0	27	0	0	27	0	0	27	108	0	52
Creative Labs Sound Blaster Edutainment CD 16	0	0	27	0	0	27	0	0	26	107	0	52
Creative Labs Sound Blaster Digital Edge 3X	0	0	13	0	0	13	0	0	13	0	0	22
Dell Dimension XPS 486V	0	0	27	0	0	27	0	0	27	108	0	52
Gateway 2000 PD4-66	0	0	26	0	0	26	0	0	26	0	0	36
Identity IDCOKIT1	0	0	46	1	0	46	3	0	45	210	0	46
MediaMagic DSP-16 Sound System	0	0	34	0	0	34	0	0	32	107	0	52
Media Vision Super Deluxe Multimedia Kit	0	0	32	0	0	33	0	0	32	117	0	56
Media Vision Premium Deluxe Multimedia Kit	0	0	19	0	0	19	0	0	19	26	0	36
Megamedia SS20	0	0	35	0	0	36	0	0	37	221	3	92
NEC Image 4100m	0	0	13	0	0	13	0	0	13	2	0	22
Ocean Vienna	0	0	47	0	0	46	107	0	45	210	0	58
Plextor 4PLaX Sound Chaser	0	0	11	0	0	11	0	0	11	0	0	21
Reveal Quantum	0	0	26	0	0	27	0	0	27	103	0	53
Sigma Designs ReelMagic: CD-ROM Upgrade Kit	0	0	34	0	0	34	0	0	32	32	0	52
Toptek Multimedia Advanced Upgrade Kit	1	0	27	1	0	27	3	0	28	72	0	48
Turtle Beach MultiSound Monterey Upgrade Kit	0	0	33	0	0	33	0	0	32	96	0	52

▼ Lower scores represent better performance

which had worse-than-average quantization (-61.3 dBr) on the Digital Playback tests. Media Vision's Pro Audio 16 sound board in the NEC Image 4100m system was slightly below average in every category. Sigma Designs' ReelMagic had no microphone input for recording.

Finally, our benchmark tests revealed a bottom tier of sound boards—Identity Systems Technology's CHIC sound card, Ocean Information Systems' Octek MV-16, the WinSound 16 in the Megamedia SS20, the Adaptec Mockingbird in Plextor's 4PLaX Sound Chaser, and Toptek Technology's Golden Sound Pro 16 Plus—that had unacceptable audio quality. The boards in the Identity and Toptek kits also had left and right channels crossed.

HOW WE TESTED

To judge the audio quality of the sound boards in the reviewed kits and MPC systems, we relied both on the subjective aural impressions of our reviewers and on objective, instrument-based tests that are routinely used to evaluate home and professional audio equipment. To generate and analyze the test signals we used the Audio Precision System One (APSO), an accepted industry-standard instrument. We used a Tektronix TDS 540 digital oscilloscope to monitor the signal being analyzed. All boards were tested in 16-bit stereo mode at a 44.1-kHz sampling rate so that we could determine whether the sound boards fulfill their claims of CD-

quality recording and reproduction. The test bed for each sound board was a Micron 466VL Magnum running MS-DOS 6.2 and Microsoft Windows 3.1.

For the **Sound Boards and Speakers:** **Frequency Response** test we generated a digital .WAV file glide tone sweeping from 20 Hz to 20,000 Hz) at a constant output level. We used the APSO analyzer to measure the amplitude reproduced by the sound board at specific frequency points.

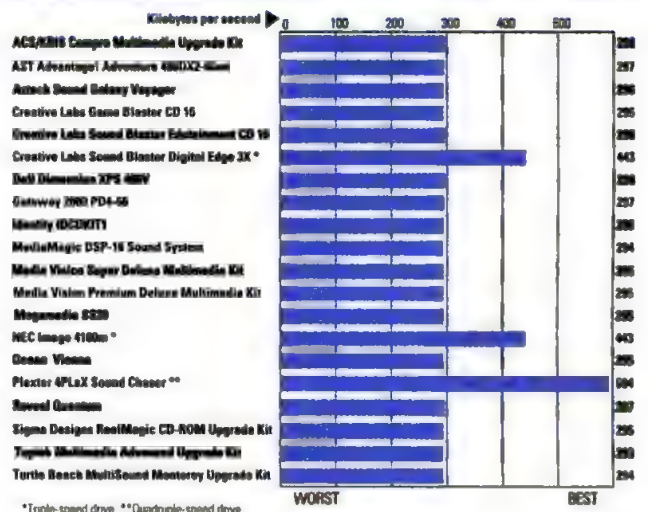
The **Preamplifier** tests measure the line-level analog audio input and output of each sound board, bypassing the digital components. We used the APSO generator to create test tones and passed those signals through the board's line-level input; we then used the APSO analyzer to monitor line-level output. We report frequency response, S/N ratio, THD+N, and channel separation.

The **Digital Recording and Playback** test measure the quality of both the analog-to-digital converter (ADC) and digital-to-analog converter (DAC) of the sound board, as well as the analog input and output circuitry. In other words, this test category measures the entire process (analog and digital) that takes place when recording a file with the board and then

playing it back (as opposed to simply playing a digital file from a prerecorded CD title). We generated pure test tones with the APSO and then recorded and played them back using each sound card. Here we report frequency response, THD+N, and quantization noise.

The **Digital Playback** tests determine the amount of degradation caused by the digital-to-analog conversion process that a board uses to play back prerecorded digital audio files. For this battery of tests, we wrote our own code for digital .WAV files of test tones (according to Microsoft Corp.'s specifications for .WAV files) and played them through the line-level output of each board. We used the APSO analyzer to measure frequency response, THD+N, and quantization noise.

CD-ROM DRIVES: SEQUENTIAL READ



*Triple-speed drive **Quadruple-speed drive

SOUND BOARDS

	Preamplifier (Analog)				Digital Recording and Playback			Digital Playback		
	Frequency response at -3 dB ^a (Hz)	S/N ratio (dB) ▲	THD+N (percent) ▼	Channel separation (dB) ▲	Frequency response at -3 dB ^a (Hz)	THD+N (percent) ▼	Quantization noise (dB) ▼	Frequency response at -3 dB ^a (Hz)	THD+N (percent) ▼	Quantization noise (dB) ▼
ACS/KRIS Compro Multimedia Upgrade Kit	14 to 20,000	76.2	0.020	-62.7	14 to 17,500	0.047	-64.8	13 to 17,000	0.026	-71.3
AST Advantage! Adventure 486DX2-66mt	<10 to 20,000	70.0	0.096	-80.6	<10 to 17,000	0.100	-65.5	<10 to 18,600	0.092	-69.5
Aztech Sound Galaxy Voyager	<10 to 18,000	68.0	0.039	-65.8	<10 to 15,000	0.052	-65.9	<10 to 19,000	0.229	-54.8
Creative Labs Game Blaster CD 16	<10 to 20,000	69.0	0.083	-82.4	<10 to 17,000	0.105	-64.1	<10 to 18,600	0.093	-69.4
Creative Labs Sound Blaster Edutainment CD 16	<10 to 20,000	70.6	0.090	-83.6	<10 to 17,000	0.095	-65.7	<10 to 18,600	0.089	-68.8
Creative Labs Sound Blaster Digital Edge 3X	<10 to 20,000	72.0	0.084	-72.8	45 to 20,000	0.098	-66.8	<10 to 20,000	0.098	-66.6
Dell Dimension XPS 466V	<10 to 20,000	69.7	0.091	-79.6	<10 to 18,000	0.099	-64.0	<10 to 18,600	0.089	-68.1
Gateway 2000	<10 to 20,000	72.7	0.041	-77.8	48.5 to 20,000	0.093	-62.4	14.1 to 20,000	0.061	-67.9
Identity IDCCKIT1	170 to 20,000	56.6	0.449	-69.2	186 to 20,000	0.499	-48.0	165 to 20,000	0.582	-49.3
MediaMagic DSP-16 Sound System	19 to 20,000	70.4	0.053	-78.7	17 to 17,900	0.061	-60.3	18 to 19,000	0.073	-62.6
Media Vision Super Deluxe Multimedia Kit	22 to 20,000	71.3	0.021	-78.2	28 to 20,000	0.088	-57.4	27 to 20,000	0.039	-68.8
Media Vision Premium Deluxe Multimedia Kit	<10 to 20,000	83.6	0.043	-52.7	15 to 20,000	0.551	-61.3	<10 to 20,000	0.051	-68.2
Megamedia SS20	46 to 20,000	76.6	0.081	-57.9	50 to 18,000	0.101	-67.7	47 to 20,000	0.092	-70.8
NEC Image 4100m	37 to 20,000	61.4	0.057	-69.6	48 to 19,000	0.240	-55.5	43.1 to 20,000	0.221	-62.2
Ocean Vienna	<10 to 20,000	63.2	0.455	-70.3	<10 to 17,000	0.548	-56.0	<10 to 20,000	0.456	-64.2
Plexor 4PLaX Sound Chaser	75 to 20,000	57.5	0.224	-68.9	69 to 18,000	0.685	-55.8	63 to 18,500	0.243	-53.9
Reveal Quantum	<10 to 20,000	71.9	0.052	-80.0	<10 to 17,000	0.270	-61.3	<10 to 19,000	0.091	-62.3
Sigma Designs ReelMagic CD-ROM Upgrade Kit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15 to 13,900	0.069	-69.1
Toptek Multimedia Advanced Upgrade Kit	172 to 20,000	69.7	0.063	-67.5	158 to 19,000	0.089	-35.0	35 to 18,800	0.079	-68.0
Turtle Beach MultiSound Monterey Upgrade Kit	<10 to 20,000	78.5	0.017	-85.8	<10 to 17,000	0.028	-71.3	<10 to 20,000	0.027	-73.6

▲ Higher scores (or smaller negative numbers) represent better performance. ▼ Lower scores (or larger negative numbers) represent better performance.

^a We measured frequency response in the range from 10 Hz to 20,000 Hz; some frequencies started below 10 Hz. N/A = Not applicable. The device can play only prerecorded files; it does not have an input port.

Speakers

WHAT THE NUMBERS MEAN

Most of the speakers that are included in the packages showed meager bass response and a high level of harmonic distortion. Only Dell's Peavey MediaVoice 200, Gateway's Altec Lansing ACS-31, Reveal's RS380, and NEC's Labtec CS-800 were powerful enough and crisp enough to be considered adequate for multimedia presentations in a small conference room.

We measured the frequency response with the speakers calibrated to output 80 dBspl (decibels, sound-pressure-level) at

1,000 Hz. As shown on the Speaker test table, we considered the frequencies where the output falls by 10 dBspl to be the end points of the frequency range of each speaker. Our Anechoic Frequency Response test showed that only the speakers that came with the Gateway 2000 and NEC MPC systems and the Reveal Quantum kit were capable of reproducing the bass sound (from 20 Hz to 100 Hz) that is within range of the better sound boards. Dell's Peavey speakers came close, starting above -10 dBspl at 108 Hz. None of the speakers

had difficulties in the treble region (from 10,000 Hz to 20,000 Hz).

Gateway's Altec Lansing ACS-31 speakers, which produced a strong bass response down to 40 Hz, were by far the best in the group.

THD+N is a good indicator of the speaker's ability to deliver the sound with clarity and genuineness. Better speakers produce a

lower score. The Reveal RS380 speakers included with Reveal's Quantum kit were the best, with a THD+N score of 2.21 percent. The Labtec CT-38s (THD+N score, 5.76 percent) bundled with all three Creative Labs packages and the Koss MD/1 speakers (6.53 percent) in the Identity kit were unacceptable.

To fill up a small conference room with ease, a pair of speakers capable of at least 90 dBspl at a distance of 0.5 meters would be required. The Quantum's speakers were the most powerful at close to 100 dBspl, and the speakers with the ACS/KRIS Compro kit and Dell and Gateway MPC systems also proved adequate.

HOW WE TESTED

For our **Speaker Output** tests, we fed each kit's speakers test tones from the APSO signal generator. We measured frequency response, THD+N, and maximum output (determined by measuring the maximum sound level before THD+N rose above 10 percent). The measurement was taken at 0.5 meters from the speaker, the accepted specification of the Electronics Industry Association (EIA).

We set up the test bed in an anechoic chamber where the ambient noise was as low as 28.7 dBspl. The sound-collecting system consisted of a Bruel & Kaer (B&K) Type 4133 measurement-quality microphone cartridge connected to a B&K Type 2639S preamplifier and a B&K Type 5935 microphone power supply.

SPEAKERS

	Frequency response at -10 dBspl ^a (Hz)	Maximum output (dBspl)	THD+N (percent) ▼
ACS/KRIS Compro Multimedia Upgrade Kit	232 to 20,000	90.2	3.31
AST Advantage! Adventure 486DX2-66mt	170 to 20,000	82.4	5.43
Artech Sound Galaxy Voyager	204 to 20,000	85.4	4.10
Creative Labs Game Blaster CD 16	101 to 20,000	85.3	5.76
Creative Labs Sound Blaster Edutainment CD 16	101 to 20,000	84.9	5.76
Creative Labs Sound Blaster Digital Edge 3X	101 to 20,000	84.9	5.76
Dell Dimension XPS 466V	108 to 20,000	95.0	3.19
Gateway 2000 PD4-66	37 to 20,000	94.0	2.97
Identity IDCCKIT1	170 to 20,000	86.6	6.53
MediaMagic DSP-16 Sound System	164 to 20,000	82.2	3.23
Media Vision Super Deluxe Multimedia Kit	164 to 20,000	86.7	3.38
Media Vision Premium Deluxe Multimedia Kit	164 to 20,000	87.3	3.38
Megamedia SS20	240 to 20,000	N/A ①	6.02
NEC Image 4100m	71 to 20,000	96.6	3.01
Ocean Vienna	164 to 20,000	89.8	3.58
Plexor 4PLaX Sound Chaser	N/A ②	N/A ②	N/A ②
Reveal Quantum	95 to 20,000	99.8	2.21
Sigma Designs ReelMagic CD-ROM Upgrade Kit	209 to 20,000	86.0	5.29
Toptek Multimedia Advanced Upgrade Kit	164 to 20,000	86.3	3.48
Turtle Beach MultiSound Monterey Upgrade Kit	N/A ②	N/A ②	N/A ②

^a We measured frequency response in the range from 20 Hz to 20,000 Hz. ▼ Lower scores represent better performance.

N/A ① -- Not applicable. The speakers are not self-powered; maximum output is not possible.

N/A ② -- Not applicable. This product does not come with speakers.

stutter and resulting in a loss of video and audio synchronization. The three CD-ROM drives that offered top-notch throughput and did not drop any frames were the NEC MultiSpin 3Xi (443 KBps), which was included in Creative Labs' Sound Blaster Digital Edge 3X kit; the Plextor PX-43CH quadruple-speed drive (594 KBps), which came with Plextor's 4PLex Sound Chaser kit; and Gateway 2000's double-speed drive/PCI controller combination, which came bundled with the Gateway 2000 P4D-66.

SPEAKER PERFORMANCE

Buying the best sound board and CD-ROM drive won't give you concert-hall sound if the accompanying speakers make everything sound as if it's coming through a tin can. To assess speaker quality, ZD Labs ran a series of standard industry tests on the 14 kits that supplied speakers. Without exception, the speakers in these kits failed to match the performance of the rest of components. Most speakers delivered only enough volume (maximum output) to fill a cubicle. The two exceptions

were Reveal Computer Products' Quantum kit, which had 40-watt-per-channel RS380 speakers and yielded a maximum output of nearly 100 dBspl, and the Gateway 2000 P4D-66, whose Altec Lansing ACS-31 speakers achieved 94 dBspl. Furthermore, the frequency response of most of the bundled speakers was severely limited, especially in the bass register, where the notes were virtually inaudible.

Nevertheless, just because multimedia kit vendors have neglected the speakers doesn't mean you should. We recommend

Do MPC Systems Measure Up?

By John R. Quain

If you're in the market for a new computer, you may be better off buying a multimedia-equipped PC now rather than adding extra multimedia hardware later. Multimedia PCs (MPCs) can be aspirin for an upgrade headache—and can save you money.

MPCs can cost only \$200 to \$250 more than comparable standard systems, while purchasing a separate upgrade kit can cost \$300 to \$500. And unlike multimedia upgrade kits, MPCs usually come with assurances that the multimedia hardware will work smoothly in your system.

For this roundup, *PC Magazine* obtained MPCs from four leading PC makers to see how they would fare against multimedia upgrade kits. The four systems tested—AST Research's \$2,399 Advantage! Adventure 486DX2-66mt, Dell Computer Corp.'s \$2,299 Dimension XPS 466V, Gateway 2000's \$2,448 P4D-66, and NEC Technologies' \$3,200 (street price) Image 4100m—all include the same components or ones similar to those found in multimedia upgrade kits.

Besides being MPC Level-2 compliant, all four systems had 8MB of RAM, and all except the Dell were Energy Star-rated. Three MPCs were based on Intel 66-MHz 486DX2 CPUs, NEC's 100-MHz 486DX4-based Image 4100m being the one exception.

AST and Dell based the multimedia

portion of their systems on the Creative Labs Sound Blaster 16 with FM MIDI synthesis. NEC's system used the Media Vision Pro Audio 16, also with an FM MIDI synthesizer. Only Gateway's P4D-66, which came with the company's Wavetable Audio Multimedia option, offered superior MIDI performance by using an Ensoniq Soundscape sound board with an on-board wavetable synthesizer.

To judge the quality of the multimedia equipment in the four systems, ZD Labs tested the overall system performance of the MPCs and then, to compare the results with the multimedia upgrade kits, placed the sound boards, CD-ROM drives, and speakers in our Micron 466VL Magnum test machine. (The only exception was Gateway's double-speed CD-ROM drive, which uses a PCI IDE controller. Our test-bed system had no PCI slots.)

The sound card and CD-ROM performance of the MPC systems closely followed that of similar multimedia kits. On frequency-response record/playback tests, for example, AST and Dell suffered from the same lack of high-end response as the comparable Creative Labs kits, dropping off between 17 and 18 kHz. NEC's system did better at reproducing high notes but fell a bit short in the low end. The Gateway also lacked some bass response, but it was the only MPC to reach 20 kHz in the high end.

On digital playback tests, the Gateway was also the only one of the MPCs—and one of only four kits—that was able to deliver the full audible frequency range. Furthermore, it managed to yield one of the lowest THD+N results.

Note that when the four MPCs were tested in their shipping configurations, the test results varied slightly from the results garnered from our test PC. The Gateway's THD+N result, for example, was slightly worse in its own system. The slight variations show how sound quality can be affected by interference generated in a PC by graphics adapter, hard disk, and motherboard components.

Buyers will find that the same problem that plagued the multimedia kits also handicaps the MPC systems. Three of the four systems include low-end speakers, which seriously retard sound quality. Furthermore, AST does not include the necessary power adapter for its speakers, an omission we found common also among the multimedia upgrade kits.

Only Gateway shipped its system with acceptable speakers, Altec Lansing's ACS-31 multimedia speakers. The ACS-31s turned out the most pleasing and sonically accurate sound we heard among the four MPCs and 16 multimedia kits. These were the only speakers that delivered acceptable bass response, while achieving one of the two best THD+N scores among all the models.

CD-ROM test results of the four

Multimedia Upgrade Kits

that you purchase separate external speakers to do justice to the 16-bit capabilities of these kits. Several suitable models from companies such as Altec Lansing Corp., Acoustic Research, and Yamaha Corp. are available, ranging in price from \$70 to \$400. (for more on speakers, see *PC Magazine*, After Hours, July 1994.)

INSTALLATION NIGHTMARES

Installing a sound card, CD-ROM drive, and the necessary software can still be a frustrating task for many users. Several of

the kits we tested had resolved many of the problems encountered with the first generation of kits by using installation programs that automatically search for available IRQs and DMA channels or let you change settings through software if you discover a conflict with other devices installed in your PC. But we still found problems in a few of the kits. Documentation was inadequate, software drivers conflicted with each other, and included CD software crashed our test system.

Your experience will depend largely

on what you already have installed in your system. Network cards, video-capture boards, and the like can raise hackles among sound cards and CD-ROM controllers. Dataquest reports that retail outlets still experience a 15 to 25 percent return rate on kits because of installation problems. If you are wary of opening up your PC, some stores will install a kit for you for free.

Next year's introduction of Windows 4.0 may eliminate many of the confusing and frustrating incompatibilities of multi-

MPCs also fell in line with those of the multimedia upgrade kits. Two of the MPCs—the AST and Dell units—included standard double-speed CD-ROM drives with controllers built into the sound cards. NEC's CD-ROM performance bested that of the other systems, however, with its NEC MultiSpin 3Xi drive and a built-in motherboard controller. It was the only one with a fast 443-kilobyte-per-second data-transfer rate, and it played back video clips effortlessly, dropping only two frames on the Custom AVI File test. Despite its lower throughput, the Gateway's combination of PCI IDE controller and NEC CDR260 double-speed drive managed to deliver the same level of video playback performance as the NEC 3Xi and did not drop a single frame on the Custom AVI File test.

FINAL JUDGMENTS

For a multimedia system, Gateway's desktop system offers the best price/performance ratio. The combination of its Ensoniq audio card and Altec Lansing ACS-31 speakers yields clear sound reproduction. Windows graphics and hard disk performance are also above average, and the Gateway gives you the most storage for the money, a 730MB IDE hard disk (our test system came with a 540MB hard disk). The basic configuration costs \$249 less without the sound card and speakers. Audiophiles, on the other hand, will want to spring for the \$219 Altec Lansing ACS-300.1 speaker option.

AST Research bundles a consider-

able amount of CD-ROM software with its \$2,399 mini-tower Advantage! Adventure 486DX2-66mt, including Microsoft Encarta, Microsoft Works, and Microsoft Publisher. It was also the only one of the four systems to include an internal 2,400-bps modem with 9,600-bps fax, and its 15-inch AST-Vision 5L monitor had a bright display. Unfortunately, AST's MPC was below average as a multimedia performer, and its 340MB hard disk and graphics

*The sound card and
CD-ROM perfor-
mance of the MPC
systems closely
followed that of simi-
lar multimedia kits.*

adapter results lagged behind the others. The basic system without the multimedia hardware costs about \$200 less.

Dell Computer's minitower Dimension XPS 466V did not fare much better when it came to multimedia work. Based on the same sound board as that used in the AST MPC (the Sound Blaster 16 Basic Edition), Dell bundles its system with Peavey speakers, which, despite the well-known brand name, yielded poor sound. On the other hand, the system itself performed well. Its 540MB IDE hard disk turned in excellent results, and its Number Nine

#9GXE graphics adapter yielded excellent graphics performance. For its \$2,299 price, the Dell system is reasonably priced but not a top multimedia performer. The basic system costs \$339 less without multimedia capability.

NEC Technologies' desktop Image 4100m, based on a 100-MHz 486DX4 microprocessor, was the fastest system in the group. The test system came with a 420MB hard disk, a MultiSync 3V monitor, Labtec CS-800 speakers, a Labtec microphone, and headphones. The outstanding component in this multimedia setup is the triple-speed MultiSpin 3Xi CD-ROM drive. Unfortunately, the Media Vision Pro Audio 16 sound card was no match for Gateway's Ensoniq card. A comparable Image 4100es system is about \$800 less without the multimedia ensemble and with only 4MB of RAM, so you're paying a substantial price for the triple-speed CD-ROM performance and sound capabilities.

Of the four systems, Gateway's and NEC's offer the best integration of components, but in general, buyers should be confident that MPC systems match the performance of comparable multimedia upgrade kits. The major benefit of an MPC is that you're saved the trauma of installing your own sound board and CD-ROM drive. Most of the PC makers offer more than one MPC system option, and several admit that they change the type of sound board or CD-ROM drive included with their MPCs. Check with the dealer about what specific components will be in your system before you buy. □

Multimedia Upgrade Kits

media upgrade kits. In conjunction with Intel and numerous third-party hardware and software makers, Microsoft plans to add Plug and Play compatibility to the new operating system, hoping that this will enable users to install peripherals and have them automatically recognized by the system software, thus resolving memory and interrupt conflicts. Note, however, that you may need a system with an upgraded BIOS to take full advantage of Plug and Play capabilities.

The yet-unrealized promise of digital signal processors (DSPs) may also get a boost from Windows 4.0. DSPs were used on eight of the sound boards in these kits to control audio functions and relieve the stress on the CPU during recording.

Although a properly designed application-specific integrated circuit (ASIC) can perform the same functions, the advantage of a DSP is that it can be upgraded through software; hence it can be used for other purposes, like a fax/modem. At the moment, however, there is no common way to access DSPs via software.

Microsoft is planning to add a DSP Resource Manager to Chicago so that all software will have a standard way of recognizing and using such hardware. It will take third-party multimedia companies a while to implement such features, but at least one—Creative Labs—has already entered an agreement to work with Microsoft on the DSP Resource Manager.

WHAT TO LOOK FOR

Before you start searching for your ideal multimedia upgrade, consider the capabilities of your existing PC. The MPC 2 specification recommends that you have, at worst, a 25-MHz 486SX PC with 4MB of RAM and a VGA display. To take advantage of all those exciting multimedia CD-ROM titles, you'll also need plenty of hard disk space. Most titles require less than a megabyte of disk space to store navigation files and frequently used graphics, but some can take as much as 10MB of storage. The MPC 2 specifica-

tion recommends you have at least a 160MB hard disk, but a 340MB hard disk is better. Also, make sure your system has at least one free 16-bit ISA expansion slot to accommodate the sound board and an empty half-height drive bay for the CD-ROM drive. If you don't have a drive bay, you can get a kit with an external CD-ROM drive for about \$50 more than an internal version.

How much you pay for a multimedia kit depends on what level of performance you're willing to accept. If you want true high-fidelity sound or a fast CD-ROM

drive, it will cost you. Turtle Beach's Multi-Sound Monterey Multimedia Upgrade Kit offers the best sound quality, for example, but it lists for \$899. Two kits offer superior CD-ROM performance: Creative Labs' \$999 Digital Edge 3X, which has a triple-speed (450-KBps) NEC Multi-

Spin 3Xi drive, and Plextor's \$749 4PLEx, which comes with the Plextor PX-43CH quadruple-speed (600-KBps) drive.

Another feature that separates the high-end packages from the less-expensive ones is the type of MIDI synthesis offered by the sound card. Of the 16 kits in this roundup, 11 are based on a less-expensive and inferior method of MIDI reproduction called *FM synthesis*. FM mimics the notes and timbre of instruments using operators or sine waves, and its reproductive powers are limited. Even the most inexperienced listener will immediately identify its tinny and thin notes as those of a synthesizer.

If you're a serious MIDI composer or if you just want better MIDI playback, look for a sound card with *wavetable synthesis*. A wavetable is essentially a stored bank of sampled notes recorded from actual acoustic instruments. Wavetable sounds are much more realistic than those created by FM synthesizers. In this group, five sound boards used a wavetable approach: Identity Systems' CHIC, Adaptec's Mockingbird (in Plextor's 4PLEx kit), the proprietary SoundFX Wave 32 (in Reveal's Quantum kit), Tiptek's Golden Sound Pro 16 Plus, and Turtle Beach's Multi-

Sound Monterey. Add-on daughterboards with wavetable synthesizers (ranging from \$99 to \$249) are available for the Futura 16 (in ACS/KRIS Technologies' Compro Multimedia Upgrade Kit), Sound Galaxy Nova 16 (in Aztech Labs' Sound Galaxy Voyager), Sound Blaster 16 Basic Edition (in Creative Labs' Sound Blaster Edutainment CD 16 and Game Blaster CD 16 kits), Sound Blaster SCSI-2 (in Creative Labs' Digital Edge kit), and Premium 3-D Sound Card (in the Media Vision Premium Deluxe kit).

Unfortunately, the quality of wavetable synthesizers varies widely. If a wavetable uses 8-bit samples, for example, the clarity of the notes it plays will suffer alongside those wavetables using 16-bit samples. Furthermore, the more instrument samples a wavetable can store, the more faithful the synthesized sound. It's impossible to store samples of every note an instrument can play, so even wavetable synthesizers have to manipulate the sounds to get the full range of notes on, say, a grand piano. How well the synthesizer manages this depends on the design of its chip and the algorithms it uses. In ears-on evaluations, we found one clear MIDI leader: Turtle Beach's Monterey. The Turtle Beach kit uses an ICS Wavefront synthesizer with 188 instruments and 18 built-in effects, including reverb and echo.

OTHER SOUND ADVICE

Make sure the sound card that comes with your upgrade kit can handle everything you may want to connect. All the kits except the Sigma Designs' ReelMagic can handle a microphone and speakers simultaneously, and Sigma Designs' card cannot accommodate a joystick or MIDI breakout connector. If you plan on using additional input devices, such as tape deck or CD-player, make sure the board has the additional inputs.

Many companies do not include the necessary AC power adapters for their speakers. This means buyers must shop around for a compatible adapter on their own; the expense is less than \$20 but a hassle just the same.

Game players should look for Sound Blaster and Ad Lib compatibility. All the kits in this roundup—except for Turtle Beach's entry—have this compatibility.

*The advantage of a
DSP is that it can be
upgraded through soft-
ware; hence it can be
used for other purposes,
like fax/modem.*

After Studying all the Angles





There's Only One Winning Shot- The **ZEOS**[®] Pantera[™]...



"...combines
quality features,
good price,
and high
performance...."
PC Magazine
Editors' Choice



"...was the
obvious choice
among the group...
our best bet."
Computer Shopper
No. 1 Choice



"...rose above
the crowd and
posted the
most impressive
performance numbers."
Windows Sources
Experts' Pick

"...is a deal you
simply can't pass up."
PC/Computing
BEST



"...Pentium-90
is the fastest
system we've
tested...This is as
good as it gets."
PC World Best Buy

Processors	Package 1	Package 2	Package 3	Package 4
486SX-33	\$1445 Lease \$61/mo.	\$1745 Lease \$64/mo.	\$2245 Lease \$82/mo.	\$2745 Lease \$100/mo.
486DX-33	\$1545 Lease \$57/mo.	\$1845 Lease \$68/mo.	\$2345 Lease \$86/mo.	\$2845 Lease \$104/mo.
486DX2-50	\$1545 Lease \$57/mo.	\$1845 Lease \$68/mo.	\$2345 Lease \$86/mo.	\$2845 Lease \$104/mo.
486DX2-66	\$1595 Lease \$58/mo.	\$1895 Lease \$69/mo.	\$2395 Lease \$88/mo.	\$2895 Lease \$106/mo.
Pentium-60	\$1945 Lease \$71/mo.	\$2245 Lease \$82/mo.	\$2745 Lease \$100/mo.	\$3245 Lease \$108/mo.
Pentium-66	\$2095 Lease \$77/mo.	\$2395 Lease \$88/mo.	\$2895 Lease \$106/mo.	\$3395 Lease \$113/mo.
Pentium-90	\$2195 Lease \$80/mo.	\$2495 Lease \$91/mo.	\$2995 Lease \$110/mo.	\$3495 Lease \$116/mo.
Standard With Every ZEOS Panthera System: ➤ Genuine Intel Processor, ZIF socket for easy upgrading. ➤ PCI local bus color graphics card upgradable to 2MB. ➤ Two high-speed serial ports and one enhanced parallel port on the motherboard. ➤ Three PCI & 5 ISA slots. ➤ Optional on-board Fast SCSI-2. ➤ Flash BIOS. ➤ 200 watt power supply with built-in surge suppressor. Switchable between 115/230V. ➤ ZEOS 101-key space-saving keyboard. ➤ FCC Certified Class B; UL Listed. ➤ ZEOS Customer Satisfaction Package.	➤ 4MB RAM ➤ 214MB local bus IDE hard drive with 32K cache ➤ 3.5" 1.44MB floppy disk drive ➤ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM ➤ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	➤ 8MB RAM ➤ 528MB local bus IDE hard drive with 256K cache ➤ 2X CD-ROM drive, 3.5" 1.44MB FDD ➤ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM ➤ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	➤ 16MB RAM ➤ 720MB local bus IDE hard drive with 128K cache ➤ 2X CD-ROM drive, 3.5" 1.44MB FDD ➤ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM ➤ ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse ➤ Choice of Lotus Windows application	➤ 24MB RAM ➤ 1GB local bus IDE hard drive with 256K cache ➤ 2X CD-ROM drive, 3.5" 1.44MB FDD ➤ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM ➤ ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch ➤ Six-bay desktop case with two cooling fans ➤ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse ➤ Choice of Lotus Windows application
Pentium Extras: ➤ RAM expandable to 192MB. ➤ Business audio integrated on the motherboard.		486 Extras: ➤ RAM expandable to 128MB. ➤ EPA Energy Star compliant.		

More processors available. Call for details.

Favorite Options

528MB to 1GB Hard Drive Upgrade\$295

1MB to 2MB Video RAM Upgrade
For more colors and higher performance\$59

Diamond Stealth 64/PCI Video Card with 2MB VRAM
Fastest 64-bit accelerated video\$249

Upgrade from a 14" to a 15" Monitor
ZEOS SVGA NI, 1024 x 768, flat screen\$95

Upgrade from a 15" to a 17" Monitor
ZEOS SVGA NI, 1280 x 1024.....\$395

SCSI Controller Chip
For on-board SCSI. Includes drivers\$49

96/48/24 V.42 bis Send/Receive Fax Modem.....\$49

Internal 14,400 bps V.32 bis Modem with 14,400 bps Send/Receive Fax Modem\$129

ZNIX EtherAction 32
32-bit PCI Ethernet LAN adapter. 10Base5, 10Base2 and 10BaseT connections.....\$199

Front Drive Bay SCM SwapBox
Full PCMCIA compatibility with desktops. Installs into 3.5" drive bay.....\$159

Internal Tape Backup
80 to 250MB (with compression), includes backup software\$159

10-Bay Vertical Case.....\$95

Multimedia Upgrade
Sound card and stereo speakers\$148

300W Power Supply Upgrade\$50

Lotus SmartSuite Upgrade
Five Windows applications (for Packages 3 & 4).....\$299

Many other affordable upgrades and options available. Call for details!

Free Software

All packages include Microsoft DOS 6.2 and Windows for Workgroups 3.11. Packages 3 and 4 come with your choice of either Lotus Ami Pro, Freelance, 1-2-3, Improv, Organizer or Approach.



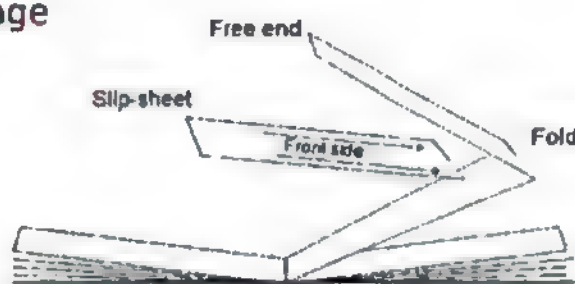
800-554-7172

24 Hours a Day
365 Days a Year



Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Government: 800-245-2449, Outside U.S. and Canada: 612-362-1212.

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet

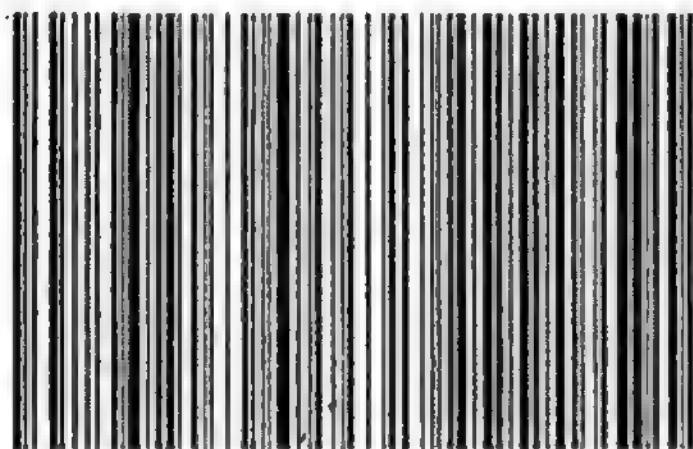


1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs51p8ack-0018

Back

1. Follow instructions on the other side

We're Racking 'Em Up.



April 12, 1994
Pentium-66
June 28, 1994
DX4-100



April 1994
Pentium-60
August 1994
Pentium-90



January 1994
486DX2-66
February 1994
486DX2-66
March 1994
486DX2-66
June 1994
486DX2-66
June 1994
Pentium-66
July 1994
Pentium-66
August 1994
Pentium-66
August 1994
Pentium-90
September 1994
Pentium-66
September 1994
Pentium-90
October 1994
DX4-100
October 1994
Pentium-90



May 1994
Pentium-66



June 1994
Pentium-66
August 1994
Pentium-90



March 1994
486DX2-66

ZEOS is on an award-winning streak... with no end in sight. Unmatched in its success, our Pantera line continues to rack up top industry awards—month after month.

Experts agree that the Pantera—based on Intel's Pentium, DX4 and 486 processors—is your sure shot.

Computer Shopper said: "ZEOS set the standard."

"The clear winner was the ZEOS Pantera. Its scores were the best across the board," reported *Windows Sources*.

PC/Computing concurred: "Rocket-fast performance and a great price make this our favorite Pentium of the lot."

Continuing with the ZEOS tradition of providing you with top performance, unwavering reliability and exceptional value, the ZEOS Pantera is unrivaled in its field.

Performance That's Unbeatable

The Pantera's supreme power and game-winning performance begins with a ZEOS designed motherboard, one that is created specifically to take full advantage of the latest technological

advancements. The motherboard is stocked with exceptional features such as an on-board PCI Local Bus IDE Controller supporting up to four IDE devices. For the fastest video performance, every Pantera comes with a new 64-bit PCI video card *standard*.

The results are unparalleled. The Pentium-66 and Pentium-90 PCs were "the fastest system(s)

ever tested" by *PC World*. "Mark a new high on the performance chart! They don't come any faster."

The ZEOS Pantera 66MHz and 90MHz also received the highest scores in all benchmark tests run by *Windows Sources*.

Every Angle Covered

From every angle, you'll come up a winner with the completely-compatible Pantera. It's the enduring champion. In addition to your choice of processors, you can choose from one of our many fully-loaded, money-saving packages (many ready to ship the same day you order) or you can custom-design a system to your exact computing needs. Either way, we've got you covered with affordable accessories, upgrades and peripherals.

What's more, you don't need a lot of green to be a winner. In fact, you'll have money left in your pocket! As *PC/Computing* said: "We suggest you spend your money on this machine—it offers the best value of any system we tested." You can buy with confidence because of our on-going commitment to provide you with high-quality features and state-of-the-art technology at an affordable price.

Even better, nobody does more to support you after the sale. ZEOS has won six *PC Magazine* Readers' Choice for Service & Reliability awards. No other company has won more. And we were the first to provide you with 24-hour toll-free technical support—every day.

Unmatched in performance, reliability, and value, the ZEOS Pantera "is the ultimate Power Desktop." As *PC World* said: "It's lightning fast, beautifully configured, and priced right. That's what power Best Buy is all about." To get your sure shot, call a ZEOS Systems Consultant now at 800-554-7172.



ZEOS Can Ship Today!

Our most popular packages can be shipped the day you call. Guaranteed!



486DX2-66 \$1895
Pentium-60 \$2245

Package #2:

- 8MB RAM
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" 1.44MB FDD
- PCI local bus SVGA video
- SVGA color monitor
- MS-DOS, Windows for Workgroups, Microsoft Mouse

486DX2-66 \$2345
Pentium-60 \$2695

Top Gun!

The above system modified to include:

- 256K SRAM cache
- Diamond Stealth 64/PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor upgrade
- 14.4/14.4 send/receive fax modem
- Choice of Lotus Windows application



PC DX4-100 \$2795

Editors' 100:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64/PCI local bus graphics card with 2MB VRAM
- 14" SVGA color monitor
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Choice of Lotus Windows application

Pentium-66 \$2995
Pentium-90 \$3095

Editors' Choice:

The above system modified to include:

- 15" SVGA color monitor upgrade
- 10-bay vertical case



Pentium-66 \$3538
Pentium-90 \$3638

Best MM:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64/PCI local bus graphics card with 2MB VRAM
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Choice of Lotus Windows application

Pentium-90 \$4395

Best MM Supreme:

The above system modified to include:

- 24MB RAM
- 1GB local bus IDE hard drive, 256K cache
- Altec Lansing high-power speakers



486SX-33 \$1195

Package #1:

- 4MB RAM, 128K SRAM cache
- 214MB hard drive, 32K cache
- 3.5" 1.44MB floppy drive
- VESA local bus SVGA color video
- SVGA color monitor
- MS-DOS, Windows for Workgroups, Microsoft Mouse



486SL-33 \$1995

Package #3:

- 8MB RAM
- 260MB IDE hard drive
- Internal 96/24 send/receive fax modem
- Custom carrying case
- Extra battery
- External charging stand
- MS-DOS, Windows for Workgroups
- 8.5" x 11.3" x 1.75" to 2.25"; 5.6 lbs.



DX4-100 \$3095

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 7.8" x 10.2" x 1.7"; 3.9 lbs.

It's As Easy As:

1 Choose the ZEOS system package you want.

(A sampling of our *Computers Now!* packages is shown at left.)

2 For same-day shipping, call ZEOS at 800-554-7172 before 1 p.m.

Central Time, Monday-Friday.

3 Upon credit approval, we'll ship your system *the same day you order!*

Our Guarantee:

If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it *at our expense* as soon as it is ready.*

Need A Bigger Monitor?

We can upgrade your *Computers Now!* desktop or vertical system with a larger monitor—and still ship it the same day you order!*

800-554-7172

24 Hours a Day



Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Outside U.S. and Canada: 612-362-1212. Government: 800-245-2449. ZEOS Information Systems, Inc. GSA# GS00K94AGS5176. Purchase Orders, MasterCard, VISA, Am Ex, Discover, COD and affordable leasing programs. Open 24 Hours a Day. 365 Days a Year!

*Orders must be for *Computers Now!* configurations; we've listed just a sampling here. Since we continuously update this list of configurations, please call to confirm your system is on the list. This offer is good only so long as these pre-built systems remain in stock. Other ZEOS systems and custom configurations may ship slightly longer—about a week. All orders are subject to credit approval. Monitor upgrades available on all desktop *Computers Now!* packages. Orders must be received by 1 p.m. Central Time. 347

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease. 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. Novell compatibility is Developer Tested. Only Novell makes no warranties with respect to this product. The Energy Star emblem does not represent EPA endorsement of any product or service. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside and Pentium Processor Logos are trademarks of Intel Corporation. ZEOS and Comenda are registered trademarks. Computers Now! is a registered service mark. Pantera is a trademark of ZEOS International Ltd. ©1994 ZEOS International Ltd. 1301 Industrial Blvd., Minneapolis, MN 55411 USA. ZEOS is a publicly traded company (NASDAQ) symbol: ZEOSI. PAN: PCM-9408

CIRCLE 155 ON READER SERVICE CARD.

Multimedia Upgrade Kits

You should be aware, however, that several manufacturers have reverse-engineered the Sound Blaster DOS-game standard. Consequently, some so-called "compatible" boards don't play precisely the sounds the game designer intended. The only aberrations discovered among the Sound Blaster-compatible boards in this group were the low volume levels demonstrated by the Megamedia SS20 and Media Vision Premium Deluxe Multimedia kits.

Business users should look for Windows Sound System compatibility. Microsoft has discontinued the hardware version of its Windows Sound System but is still marketing its Windows Sound System 2.0 business software and has been pushing more third-party companies to offer it as an option with their kits. Market leader Creative Labs, for example, has agreed to license the Windows Sound System.

Recorded .WAV files can take up enormous amounts of hard disk space. For example, a 10-second stereo sample recorded at a 16-bit, 44.1-kHz rate can take up 1.8MB. To make sound files manageable, most sound cards support some type of compression/decompression standard. One advantage of the Windows Sound System is that it supports several compression schemes, including the TrueSpeech standard developed by the DSP Group. TrueSpeech yields much smaller files while preserving much of the fidelity of voice recordings. A 10-second voice annotation recorded using TrueSpeech takes a mere 13K; the same sample recorded in 8-bit, 11-kHz mode takes about 117K of disk space. Of the upgrade kits in this roundup, only those by Sigma and Turtle Beach are not Windows Sound System-ready.

Every kit comes with basic Windows sound utilities for playing and recording .WAV files, playing MIDI files, and controlling audio CDs. Several also include simple voice-command software. These programs, however, lack the sophistication necessary for serious use. The premium software most often included are CD-ROM games and reference titles. But check with the dealer if you're looking for something specific, because many of the vendors frequently change bundled CD-ROM titles.

Shoppers will find that there is no standardized controller for CD-ROM drives.

If you want to save expansion slots, look for a kit that has a built-in controller on the sound card. Ten of the kits in this group use proprietary controllers, which may force you to buy a new controller if you upgrade the drive later on. IDE-based CD-ROM drives are beginning to make an appearance in the market, but none of the kits here used a true standard IDE configuration.

The main advantage of SCSI-1 and SCSI-2 controller cards is that they can usually accommodate several SCSI devices (up to seven) chained together. This is not always the case, however. Most of the SCSI controllers we found in these kits could not control bootable drives, which means you would still need another SCSI controller for a PC's SCSI hard disk. An exception to this was the SCSI controller on the Adaptec Mockingbird sound card contained in Plexor's 4PLex kit.

Finally, when choosing your multimedia kit, make sure the manufacturer provides good technical support, which should include a toll-free number and seven-days-a-week service. You'll undoubtedly need it. Even if your installation goes smoothly, multimedia software titles you buy later may need tweaking in order to work properly with your kit.

ACS/KRIS Technologies Inc.

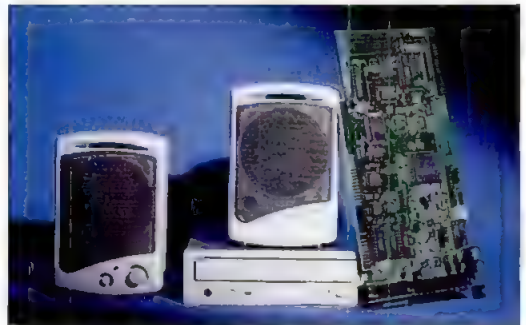
• Compro Multimedia Upgrade Kit

BY DAVE SALVATOR

With its rock-bottom list price of \$340, the Compro Multimedia Upgrade Kit offers good performance and features for the home user, but it has too many rough edges to make it a true bargain. The Compro package includes a double-speed Panasonic LaserMate 562 CD-ROM drive; an FM-based Futura 16 sound card that can be upgraded to wavetable synthesis using either an ACS daughterboard (\$99) or the Creative Labs Wave Blaster (\$249); a pair of Compro SP-681 speakers; and an impressive supply of multimedia titles such as *The New Grolier Multimedia Encyclopedia* and *Just Grandma and Me*.

Installation can best be described as quirky. The kit comes with a proprietary mixer applet and a suite of Microsoft

Windows Sound Systems business applications, including another mixer. Unfortunately, the Microsoft drivers conflict with that of the proprietary mixer. The installation batch file for the CD-ROM drive can map the drive to only one set of addresses, so if you encounter conflicts with your existing system configuration



ACS/KRIS Compro Multimedia Upgrade Kit.

you have to reconfigure your other hardware.

The Panasonic LaserMate 562's performance fell in the middle of the pack, which is impressive considering the low price of this package. On our Sequential Read test, the LaserMate 562 achieved an average throughput of 298 kilobytes per second. The Panasonic handled 8-bit video, 16-bit video, and Indeo-compressed files perfectly, but it dropped 45 percent of the video frames in the more rigorous custom AVI file.

The Futura 16's relatively flat frequency response and better-than-average scores on our tests translated to clean sound with no hiss. The Compro SP-681 speakers, while adequate, showed a disappointing lack of bass response. As is the case with many other vendors in this roundup, ACS/KRIS Technologies does not provide an AC adapter for the speakers.

► **Compro Multimedia Upgrade Kit.** List price: \$340. ACS/KRIS Technologies Inc., 398-400 Convention Way, Redwood City, CA 94063; 800-282-5747, 415-780-9988; fax, 415-780-0222.

Circle 444 on reader service card

Aztech Labs Inc.

• Sound Galaxy Voyager

BY JOHN R. QUAIN

The ideal multimedia upgrade kit is inexpensive, easy to install, and delivers high-fidelity sound. The Sound Galaxy Voy-

Multimedia Upgrade Kits

ager multimedia upgrade kit clears the price hurdle (\$399 list, \$349 street), but installation glitches and mediocre audio performance make it less than ideal.

The Sound Galaxy sound card uses Aztech Labs' own application-specific integrated circuits (ASICs) to handle audio tasks; a proprietary on-board CD-ROM controller can manage drives from Mitsumi, Panasonic, and Sony. To keep the price low, Aztech has opted for the less-effective MIDI FM synthesis rather than a wavetable. For better MIDI reproduction, a wavetable daughterboard with 2MB of ROM is available for \$149.

On the whole, performance on our audio tests was below average. The board's frequency response in digital playback was fine, but its total harmonic distortion score was a high 23 percent. When recording and playing back a sample, we found that the frequency response was limited in the high-treble range, so this kit is not ideal for recording music samples; voice annotations, however, were clear. As for the speakers, poor bass response tends to dull the sound overall. The speakers are self-powered, but Aztech does not include the AC adapter.

The package's internal double-speed CD-ROM drive (based on a Philips mechanism) performed up to par on our

not run properly if DOS Share is loaded; and the Windows applets are not part of the installation (you are left to discover on your own that they are on the included Professor Multimedia CD). Other included titles are Indiana Jones and The Fate of Atlantis, The Software Toolworks Multimedia Encyclopedia, and Wired for Sound PRO CD.

► **Sound Galaxy Voyager Double-Speed Multimedia Upgrade Kit.** List price: \$399. Aztech Labs Inc., 46707 Fremont Blvd., Fremont, CA 94538; 800-886-8859, 510-623-8988; fax, 510-623-8989.

Circle 445 on reader service card

Creative Labs Inc.

- **Game Blaster CD 16**
- **Sound Blaster Edutainment CD 16**
- **Sound Blaster Digital Edge 3X**

BY JAE YANG

No single multimedia upgrade kit is right for all users, so Creative Labs puts out three. The ease of installation and guaranteed Sound Blaster compatibility that these kits offer make them ideal for novice users, and upgradability helps ensure that they won't be outgrown. Disappointing speakers and an expensive wavetable upgrade option (\$249), however, mar all three bundles.

If games are your gig, the \$549 (\$429 street) Game Blaster CD 16 offers pleasing performance, a joystick, and some hot CD titles (including Iron Helix, Return to Zork, and Sim City 2000). The Sound Blaster 16 Basic Edition sound card, a recent Editors' Choice recipient (*PC Magazine*, April 12, 1994), turned in better-than-average scores on our tests. The noise level of the analog circuitry was relatively low, and the card delivered rich sound from bass to treble.

Down the road you may want your machine to handle more demanding tasks, and this sound card accommodates, with a socket for the company's Advanced Signal Processor-16 chip (\$69.95). This proprietary DSP handles compression and decompression chores,

freeing up your CPU. The arcade-quality sound of the Yamaha OPL3 FM synthesizer can be replaced by adding the Wave Blaster wavetable synthesis daughtercard (\$249).

The included double-speed CD-ROM drive (based on a Panasonic 563 mechanism) ranked with the best on our benchmark tests, dropping no audio or video clips under normal use and scoring about average on the custom AVI file. Also, there is a Sony-Philips Digital Interface Format (SPDIF) connector socket on the back to send digital audio signals directly to a sound card. At present, no multimedia sound boards have the required inputs, but with this drive you will be ready for the next generation of cards.

The weak link in this package is the pair of Labtec CT-38 speakers. The total harmonic distortion of 6 percent at 80 dBspl left us wanting more crispness and punch, and bass response was lacking. Still, the Game Blaster CD 16 does have the potential to expand into a more powerful multimedia machine, albeit at significant expense. Its compatibility and upgradability may suit those who are in it for the fun now, the business later.

More serious-minded business and educational types should look at the Sound Blaster Edutainment CD 16 bundle (\$599.95 list, \$449 street), which adds a microphone and CD titles that your purchasing department may actually approve paying for, such as Aldus Photostyler SE, Creative Talking Scheduler, and Quicken Deluxe CD-ROM. Built around the same sound card and CD-ROM drive as the Game Blaster 16, this kit offers performance that is more than adequate for most applications. For more demanding multimedia tasks, you'll want to consider adding the ASP chip. Installing the Edutainment CD was quite simple. The installation program is straightforward, and the manual offers clear instructions for those who wish to custom-configure the components. Unfortunately, this kit too gives you the Labtec CT-38s.

Users who are even more serious may want to consider the Sound Blaster Digital Edge 3X, which delivers a triple-speed CD-ROM drive and a DSP-equipped SCSI-2 sound card. This upgrade kit excelled in every category of our performance test suite except the speaker

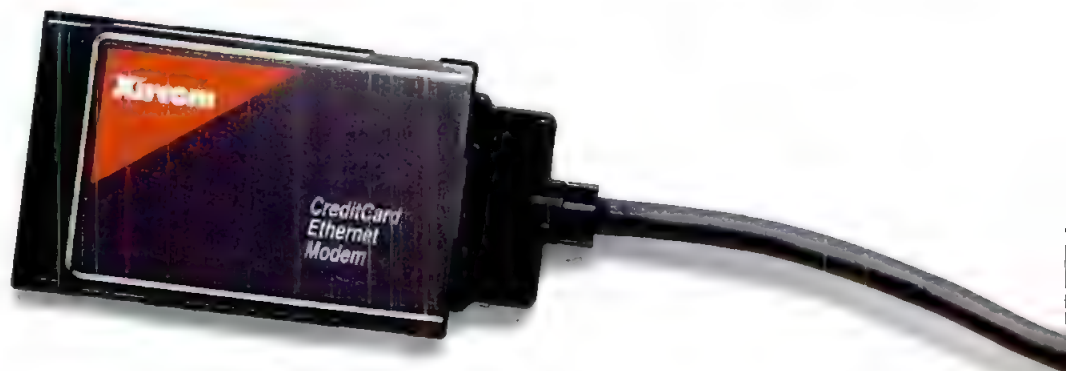


Aztech Sound Galaxy Voyager.

tests and proved better than most in playing back video clips. The drive has a mini headphone jack, a volume control, and convenient play and skip buttons for playing audio CDs without using software.

Unfortunately, there are some installation nuisances you should note. The hardware instructions do not indicate which CD-ROM controller connection to use; the software installation routine can-

THE ETHERNET+MODEM.



PLUG IN. LOG ON. DIAL OUT.

Xircom introduces the one card that does it all. The amazing all new Xircom Ethernet+Modem notebook adapter.

Just plug it into your notebook and log onto any Ethernet LAN on any network operating

system anywhere. Or dial into any online service, E-mail system or BBS. Available in both PCMCIA Type II CreditCard and parallel port versions, the Ethernet+Modem gives



Ethernet+Modem requires no batteries or AC adapter.

you modem transfer rates up to 19.2Kbps with full error correction and data compression. It sends and receives faxes. Comes with its own DOS or Windows data and fax software. And includes easy-to-use Windows-based installation software. Best of all, it is the first adapter that provides simultaneous LAN and fax modem connectivity through just one slot for unparalleled convenience. The combination Ethernet+Modem has connections for both 10Base-T and 10Base-2.

Your Ethernet+Modem comes with a lifetime

**FASTER
WITH
V.32terbo
19,200**

warranty from Xircom. The leader in notebook connectivity with more notebooks connected to more LANs than all other vendors combined.

Ask your dealer about the Ethernet+Modem today. Or call us at 1-800-438-4526 ext. 22B to take advantage of our lifetime upgrade policy and trade in your current LAN adapter for a new Ethernet+Modem at half the regular price.

Then plug in, log on and dial out.

Xircom
The Mobile Networking Experts.

tests—again pointing to the inadequacy of the Labtec CT-38s. Included in this \$999 deal (\$759 street) are a microphone and a slew of CD-ROM titles (including Aldus Photostyler SE, Altamira Composer, Digital Morph, Indianapolis 500, and the New Grolier Multimedia Encyclopedia).

The centerpiece of the Digital Edge



Creative Labs Sound Blaster Edutainment CD 16.

kit is Creative Labs' ASP-equipped Sound Blaster 16 SCSI-2 card, but it is the NEC MultiSpin 3Xi triple-speed drive that puts this multimedia machine ahead of the pack. We found the drive capable of sustained 443-kilobyte-per-second throughput—performance surpassed only by the quadruple-speed Plextor drive. The NEC MultiSpin 3Xi and Plextor CD-ROM drives were the only ones to make it through our custom AVI file without dropping video frames.

The Sound Blaster 16 SCSI-2 card was one of the best in terms of overall subjective audio performance. Its 72-dBr signal-to-noise ratio was impressive when compared with that of most other cards in this roundup.

Serious MIDI users will want to replace the Yamaha OPL-3 FM synthesizer with the Wave Blaster wavetable synthesis daughtercard (\$249), and they will want to replace the speakers as well. This all makes for a pricey proposition, but the quality of the components is top-notch.

►**Game Blaster CD 16.** List price: \$549. **Sound Blaster Edutainment CD 16.** List price: \$599.95. **Sound Blaster Digital Edge 3X.** List price: \$999. Creative Labs Inc., 1901 McCarthy Blvd., Milpitas, CA 95035; 800-998-5227, 408-428-6600; fax, 408-428-6611.

Circle 446 on reader service card

Identity Systems Technology Inc.

• IDCDKIT1

BY BEN MILLER

The IDCDKIT1 was one of the worst performers in this roundup. This \$329 kit comes with a double-speed Laser Magnetic Storage CD-ROM drive, a CHIC sound card, a pair of amplified Koss MD/1 speakers, and just three CD-ROM titles—Compton's Interactive Encyclopedia, Compton's Family Choice (a collection of family-oriented titles), and some DOS games.

Installing the kit was straightforward despite the fact that Identity Systems didn't send us documentation. An included installation software utility tests for and resolves potential IRQ and memory address

conflicts between the sound card and other hardware. This utility also installs the proper device drivers and command execution statements into the system's CONFIG.SYS and AUTOEXEC.BAT files.

The Laser Magnetic CD-ROM drive, a caddyless model, has a tray that seemed fragile and wobbly. Its performance was below average: While it achieved a throughput of 296 kilobytes per second on our Sequential Read test, it was one of only three drives to drop video frames while running our Indeo Video Compression multimedia file and was the second



Identity IDCDKIT1.

worst performer running our custom AVI file.

The CHIC sound card, which is based on Media Vision's Jazz 16 chip set, performed poorly as well, demonstrating little bass response and very poor scores for total harmonic distortion and signal-

to-noise ratio. These results indicate a problem with both the analog and digital circuits on the card. We found also that the left and right stereo signals were crossed. On subjective listening tests, the sound was weak and tinny, with significant background noise. The Koss speakers suffered from poor bass response, as did the speakers in most other kits in this roundup.

On the whole, this is a lackluster kit that offers little in terms of performance, capability, or CD-ROM variety.

►**IDCDKIT1.** List price: \$329. Identity Systems Technology Inc., 1235 W. Trinity Mills Rd., Carrollton, TX 75006-1365; 800-723-8258, 214-323-4600; fax, 214-323-0666.

Circle 447 on reader service card

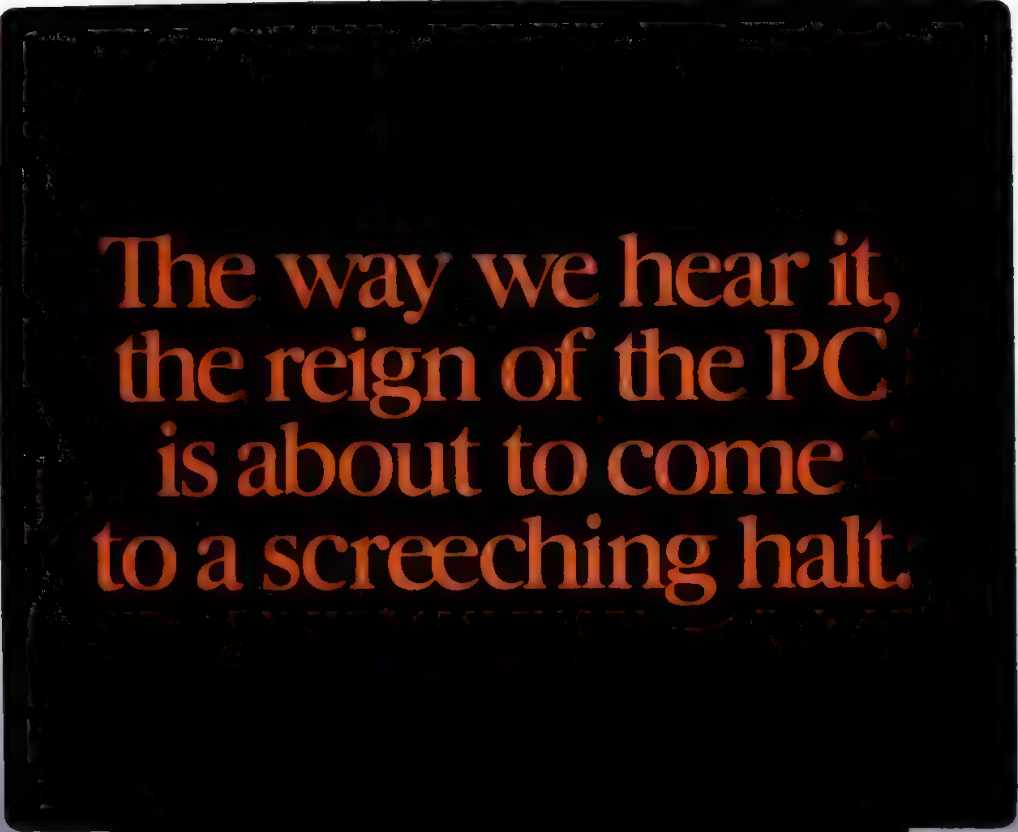
MediaMagic

• DSP-16 Sound System

BY DAVE SALVATOR

Priced at \$429 (\$329 street price), MediaMagic's DSP-16 Sound System is aimed at home users who would like to climb aboard the multimedia magical mystery tour. Unfortunately, a cryptic CD-ROM drive installation, out-of-date documentation, and an FM-based sound card with no wavetable upgrade option are detours along the way. On the positive side, the bundled DSP-16 audio board yielded very good performance in sound board testing, and the Sony CDU-33A double-speed CD-ROM drive (which was selected as an Editors' Choice in our roundup "CD-ROM Drives: Going Mainstream," *PC Magazine*, February 22, 1994) performs as well as some of the more expensive kits in this roundup.

The kit comes with five CD-ROM titles, including Compton's Interactive Encyclopedia and Gabriel Knight. Also included is Softbank's On Hand Software, a software catalog that shows you demos of more than 100 mainstream business applications (Lotus SmartSuite, Microsoft Office, Microsoft Visual Basic, Paradox, Quattro Pro, WordPerfect, and more) and lets you access the full applications by calling Softbank and getting a key code. You also get a suite of audio applications from Voyetra Technologies, including a .WAV file editor, a MIDI se-



The way we hear it,
the reign of the PC
is about to come
to a screeching halt.



Say hello
to the first
PC&C.
Globalyst.



It's the Internet. It's shared cursor. It's videoconferencing. It's your Secret Weapon against the Other Guys.

It's the new world of Personal Computing and Communications—PC&C. And it's as far beyond the PC you're using now as the Cruise Missile is beyond the cannon ball.

No, it's not some proprietary system. But open, industry-standard technologies taken to the next level. Unified, seamless solutions.

Our Globalyst™ PC&Cs include the AT&T Vistium™ Personal Video, the system that won the PC Magazine Editor's Choice Award for the best desktop videoconferencing solutions. It's the one with true application sharing. So two people can work together on the same document at the same time in two different locations.

Not to mention the solution that's the first true marriage of the telephone and the computer.

There are three easy ways to order your Globalyst PC&Cs. You can order from America's premiere resellers, from the finest PC retail outlets, or direct. And you can reach them all at this number.

1 800 335-4090

In the weeks to come, we'll be showing you all the secrets of these secret weapons. So stay tuned.

GET IT.
move
USE IT.

*Now that NCR and AT&T are one, computing
and communications have come together to help you
get, move, and use information.*



AT&T

Global Information
Solutions

SUMMARY OF FEATURES

Multimedia Upgrade Kits

Products listed in review order

■ = YES □ = NO

	ACS/KRIS Compro Multimedia Upgrade Kit	Aztech Sound Galaxy Voyager	Creative Labs Game Blaster CD 16	Creative Labs Sound Blaster Entertainment CD 16	Creative Labs Sound Blaster Digital Edge 3X	Identity IDCOKIT1	MediaMagic DSP-16 Sound System
List price	\$340.00	\$399.00	\$549.00	\$599.95	\$999.00	\$329.00 (estimated street price)	\$429.00
CD-ROM Drive							
CD-ROM drive included in kit	Laser Mate 562	Aztech CDA 268 OIA	Panasonic 563 (proprietary version)	Panasonic 563 (proprietary version)	NEC MultiSpin 3Xi (triple-speed)	Laser Magnetic Storage (LMS)	Sony CDU-33A
Type	Internal	Internal	Internal	Internal	Internal	Internal	Internal
Mechanism manufacturer	Panasonic	Philips	Proprietary	Proprietary	NEC	LMS	Sony
Data-transfer rate (kilobytes per second)	300	300	300	300	450	353	300
Average access time (milliseconds)	320	350	320	320	195	325	320
Interface	Panasonic	Mitsumi	Panasonic	Panasonic	SCSI	Proprietary	Sony
Supports multisession Photo CD	■	■	■	■	■	■	■
Manual eject/Software-controlled eject	■ ■	■ ■	■ □	■ □	■ □	■ ■	■ ■
Disks enclosed in caddies	□	□	□	□	■	□	□
Buffer size	64K	64K	64K	64K	256K	64K	64K
Sound Board							
Sound board included in kit	Futura 16	Sound Galaxy Nova 16	Sound Blaster 16 Basic Edition	Sound Blaster 16 Basic Edition	Sound Blaster 16 SCSI-2	Identity Systems' CHIC	Media Magic DSP-16
Sound board chip set	Crystal	Proprietary	Yamaha OPL3	Yamaha OPL3	Yamaha OPL3	Media Vision Jazz 16	Analog Devices 2115
On-board DSP manufacturer	N/A	Crystal	N/A	N/A	Creative Labs	N/A	Analog Devices
MIDI synthesizer chip	Yamaha OPL3	Yamaha OPL3	Yamaha OPL3	Yamaha OPL3	Yamaha OPL3	Media Vision Jazz 16	Analog Devices 2115
FM synthesis	■	■	■	■	■	■	■
Wavetable synthesis	Optional (\$99)	Optional (\$149)	Optional (\$249)	Optional (\$249)	Optional (\$249)	■	□
Supports MIDI-file recording/playback	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
CD-ROM connector	Mitsumi, Panasonic, or Sony, SCSI optional (\$24.99)	Mitsumi, Panasonic, or Sony	Proprietary	Proprietary	SCSI	N/A	Sony
Compression:							
ADPCM compression/decompression	■ ■	□ ■	■ ■	■ ■	■ ■	■ ■	■ ■
A-Law compression/decompression	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Mu-Law compression/decompression	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
MPEG decompression	□	□	□	□	□	□	□
Compatible with:							
Sound Blaster/Ad-Lib	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Microsoft Windows Sound System	■	■	■	■	■	■	■
Connectors:							
Headphone/Powered speaker	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Microphone/Mini line-in	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
IRQ levels supported	5, 7, 9-11	2, 3, 5, 7, 10	2, 5, 7, 10	2, 5, 7, 10	2, 5, 7, 10	2, 3, 5, 7, 10, 15	3-5, 7, 9-12
Number of selectable addresses	7	8	4	4	4	3	2
Other Components							
Speakers	Compro SP-681	Aztech FX20 Amplified Speakers	Labtec CT-38	Labtec CT-38	Labtec CT-38 or Koss MD/1	Labtec CS-550	Labtec CS-150
Headphones/microphone	■ ■	□ ■	□ ■	□ □	□ ■	□ □	□ □
Customer Service							
Technical-support number	415-780-9988	800-886-8879	408-742-6622	408-742-6622	408-742-6622	800-723-8324	800-246-7037
Hours (eastern time)	12:00-8:30 M-F	10:00-9:00 M-F	9:00 A.M.-11:00 P.M., 7 days	9:00 A.M.-11:00 P.M., 7 days	9:00 A.M.-11:00 P.M., 7 days	9:00-6:00 M-F	24 hours, 7 days
Warranty	1 year parts, 2 years labor	1 year	1 year	1 year	1 year	1 year	1 year

N/A—Not applicable: The product does not have this feature

COVER STORY

Multimedia Upgrade Kits

					PC MAGAZINE The Best of 1993		PC MAGAZINE The Best of 1993	
Media Vision Super Deluxe Multimedia Kit	Media Vision Premium Deluxe Multimedia Kit	Megamedia \$320	Ocean Vienna	Plextor 4PLx Sound Chaser	Reveal Quantum	Sigma Designs ReelMagic CD-ROM Upgrade Kit	Toptek Multimedia Advanced Upgrade Kit	Turtle Beach MultiSound Monterey Multimedia Upgrade Kit
\$499.00	\$599.00	\$379.00	\$375.00	\$749.00	\$599.00 (estimated street price)	\$799.00	\$899.00	\$899.00
Sanyo CDR H93MV	ReNO Portable	NEC CDR210	Mitsumi FX001D	Plextor PX-43CH	Panasonic 563 (proprietary version)	Sony CDU-33A	Panasonic CR-5338	Sony CDU-33A
Internal	External	Internal	Internal	Internal (external version available)	Internal	Internal	Internal	Internal
Sanyo 300	Panasonic 300	NEC 300	Mitsumi 300	Plextor 600	Reveal 300	Sony 300	Panasonic 307	Sony 300
320	180	350	250	220	320	320	290	320
SCSI	SCSI	SCSI	Mitsumi	SCSI	Proprietary	Sony	SCSI	Sony
■	■	■	■	■	■	■	■	■
■ ■	■ □	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
□	□	□	■	■	□	□	■	□
34K	64K	64K	64K	1 MB	64K	64K	256K	64K
Proprietary	Media Vision Premium 3-D	Sigma Designs WinSound 16	Octek MV-16	Adaptec Mockingbird	SoundFX Wave 32	ReelMagic	Golden Sound Pro 16 Plus	MultiSound Monterey
Media Vision VVD101	Media Vision MVD1216	Media Vision Spectrum	Media Vision Jazz	Analog Devices 2115	Ensoniq Soundscape	Yamaha OPL2	Crystal CS4231KL	Motorola 56001
N/A	N/A	N/A	Media Vision	Analog Devices	N/A	Analog Devices	Toptek	Motorola
Yamaha OPL3	Yamaha OPL3	Yamaha OPL3	Media Vision MVA416	Analog Devices 2115	Ensoniq Soundscape	Yamaha OPL2	Yamaha OPL4	ICS WaveFront
■	■	■	■	■	■	■	■	□
□	Optional (\$199)	□	□	■	■	□	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	□ ■	■ ■	■ ■
SCSI	SCSI	SCSI	Mitsumi	SCSI	Mitsumi, Panasonic, or Sony, IDE	Sony	SCSI	None
■ ■	■ ■	■ ■	■ ■	■ ■	□ ■	□ □	■ ■	■ ■
■ ■	■ ■	□ □	■ ■	□ □	□ ■	□ □	■ ■	□ □
■ ■	■ ■	□ □	■ ■	□ □	■ □	□ □	■ ■	□ □
□	□	□	□	□	□	■	□	□
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	□ □
■	■	■	■	■	■	□	■	□
■ ■	■ ■	□ ■	■ ■	■ ■	■ ■	■ ■	■ ■	□ ■
■ ■	■ ■	■ ■	■ □	■ ■	■ ■	□ □	■ ■	□ ■
1, 3, 5, 7, 11, 15	1, 3, 5, 7, 11, 15	2, 3, 5, 7, 10-12, 15	2, 3, 5, 7, 10, 15	3, 5, 7, 9-12	2, 5, 7, 15	5, 7, 9-12, 15	2, 5, 7, 10-12	5, 7, 9-12, 15
2	4	4	4	4	4	5	2	8
Proprietary	Proprietary	Midi Land CP55	Midi Land multi-media speakers	N/A	Reveal RS380	Sigma Designs WS-35	Midi Land CP28	N/A
■ ■	■ ■	□ □	□ □	■ ■	■ ■	□ □	□ ■	□ □
800-638-2807	800-638-2807	408-428-9920	818-339-8888	800-886-3935	800-473-8325	510-770-0100	800-416-8885	717-764-5265
9:00 A.M.-11:00 P.M., 11:00-7:00 Sat, Sun	9:00 A.M.-11:00 P.M., 11:00-7:00 Sat, Sun	8:00-5:00 M-F	11:00-8:00 M-F	11:30-8:30 M-F	24 hours, 7 days	11:00-8:00 M-F	11:30-8:30 M-F	9:00-8:00 P.M. M-F
3 years	3 years	1 year	1 year	2 years	90 days	5 years	1 year	1 year

WIN

In all respects, it's a

“Outstanding”

level of performance...

go al



On June 28th, PC Magazine announced its Editors' Choice Awards. We'd like to thank them for making the HP Vectra XU PC a winner, and for doing an excellent job of writing this ad. For additional reading materials, call us today at 1-800-322-HPPC, Ext. 8518.

"The HP Vectra XU PC is a

**power
user's
dream"**

**"most
advanced
design
of any system..."**

**generation
ahead
of the pack"**

Believe everything you read.



**HEWLETT
PACKARD**

quencer, and a jukebox applet.

Installing the DSP-16's audio drivers is simple. I/O settings for digital audio and MIDI are software programmable, so there are no DIP switches to wrestle with. Unfortunately, when MediaMagic revised its sound board installation utility to include the CD-ROM driver, it forgot to update its documentation, which points you to subdirectories the utility does not create.

Compounding the confusion, the CD-ROM drive connectors are not keyed in any way, so it's impossible to tell which way is up when you plug them in. Unlike a SCSI CD-ROM drive, however, the



MediaMagic DSP-16 Sound System.

Sony drives, which have proprietary interfaces, are not damaged if you wire them backwards; they simply don't work. To its credit, MediaMagic's technical support was very helpful working through the glitches we encountered, but the call shouldn't have been necessary.

On our CD-ROM Drives: Multimedia Playback tests, the DSP-16 kit performed respectably, yielding a throughput of 294 kilobytes per second on the Sequential Read test. It dropped frames only on our most rigorous custom AVI file segment of the Multimedia Playback sequence.

The DSP-16 card scored above average on all our sound tests and sounded clean and full in subjective listening tests. The speakers included at the time of our review, Quick Shot Sound Mate 3, fared well on our tests. By the time you read this review, MediaMagic will be bundling Labtec CS-150 speakers, which we did not test.

► **DSP-16 Sound System.** List price: \$429. MediaMagic, 10300 Metric Blvd., Austin, TX 78758; 800-624-8654, 512-339-3500; fax, 512-454-1357.

Circle 449 on reader service card

Media Vision Inc.

• Super Deluxe Multimedia Kit

• Premium Deluxe Multimedia Kit

BY BEN MILLER

Media Vision offers two kits for home users: the Super Deluxe Multimedia Kit (list price, \$499) and the Premium Deluxe Multimedia Kit (list price, \$599). Both come with a good sample of family-oriented games and reference CDs, including Compton's Interactive Encyclopedia, Home Survival Toolkit, Iron Helix, Kid's Zoo, Mayo Clinic Family Health Book, and Return to Zork.

Both come also with FM-based sound cards, double-speed SCSI CD-ROM drives, and powered speakers. The Super Deluxe was a solid performer on the whole; the higher-priced Premium Deluxe, however, yielded mixed results.

The Super Deluxe kit comes with an internal Sanyo CDR H93MV CD-ROM drive, a custom 16-bit Media Vision sound card, and 4-watt proprietary speakers. Installation was simplified by Media Vision's excellent installation software, which automatically detects DMA and IRQ settings for the sound board.

The Sanyo drive was an average performer, achieving throughput of 295 kilobytes per second on our 16K-block Sequential Read test. Multimedia playback was uneventful on all of our tests except on the rigorous custom AVI file, where the Sanyo dropped several video frames but did not suffer any breaks in audio.

The custom 16-bit sound card, which is based on Media Vision's MVD101 chip set, also performed solidly, with flat frequency response across the spectrum and good scores in terms of signal-to-noise ratio, total harmonic distortion, and stereo separation. On subjective tests, we found that the sound was clean, with little background noise and decent highs and lows. Our only objection is that there is no wavetable up-

grade option for the custom board, which comes with an FM synthesizer. The included speakers performed decently on the whole but did suffer from poor bass response.

The Premium Deluxe kit comes with the Media Vision Reno, an external, portable double-speed SCSI CD-ROM drive with a streamlined case from frogdesign, the same company that developed many of Apple Computer's innovative cases. It is a nice-looking drive, but we found the lid to be a little flimsy.

The sound card in this kit is the Media Vision Premium 3-D, which is FM based but also has a wavetable upgrade option (\$199) and adds "surround-sound" 3-D capability to sound recording and playback.

Again, installation was simplified by Media Vision's software utility. Unfortunately, however, performance was mixed on our sound tests, with excellent frequency response, the highest signal-to-noise ratio in this group, and good quantization scores, but with very high total harmonic distortion in Digital Recording and Playback tests and poor stereo separation. Harmonic distortion scores were low, however, on analog frequency-response tests. On subjective tests, the Premium 3-D's sound was weaker than that of the custom Media Vision board, and we detected a little background noise.



Media Vision Premium Deluxe Multimedia Kit.

The Reno was a solid performer, achieving throughput of 295K per second on our 16K-block Sequential Read test and very good scores on all our multimedia playback tests. Our only criticism is that installation was complicated by the drive's external configuration, which requires an external connector on a second

Multimedia Upgrade Kits

minicard that attaches to the sound card and takes up an additional port opening. Speaker-output scores were average, with poor bass response.

► **Media Vision Super Deluxe.** List price: \$499. **Media Vision Premium Deluxe.** List price: \$599. Media Vision Inc., 47300 Bayside Pkwy., Fremont, CA 94538; 800-845-5870, 510-770-8600; fax, 510-770-9592.

Circle 448 on reader service card

Megamedia Computer Corp.

• Megamedia SS20

BY DAVE SALVATOR

Featuring an FM-based Sigma Designs WinSound 16 sound board, a NEC CDR210 double-speed SCSI CD-ROM drive, and Midi Land's CP-55 speakers, the Megamedia SS20 multimedia upgrade kit is aimed at the home user who wants to add sound to games and explore the world of CD-ROM-based titles. List priced at \$379, it comes with 19 educational and recreational titles, including America Adventure, Dinosaur Adventure, Family Doctor III, Gus Goes to Cybertown, Iron Helix, Kid's Zoo, Works of Shakespeare, and World Atlas 4.0.

Unfortunately, a few of the titles use QuickTime Player for Windows, which causes them to crash periodically on start-up, and playback of both QuickTime movies and AVI files is less than smooth. The WinSound 16 board has a Media Vision Spectrun chip set for audio playback, but its FM synthesizer produces tinny MIDI sounds. No wavetable upgrade option is offered.

Installing the SS20 kit is reasonably straightforward. The installation utilities are easily navigated; IRQs and DMAs are software addressable, eliminating worries about DIP switch settings. The documentation has some helpful illustrations, but many of them are devoted to a different model of the sound board that has a VGA accelerator chip. An audio-only version of the manual would be helpful.

The Megamedia SS20 turned in disappointing numbers in our sound card and speaker tests. The WinSound 16 board was average or below in most categories except signal-to-noise ratio, where it was third best. We heard very



Megamedia SS20.

little background noise in subjective testing, but bass response was poor. Driven by the sound board's amplifier, the unpowered MLI CP-55 speakers also delivered anemic low-end response, and bass was woefully lacking in music passages.

The NEC CDR210's performance was just a little better. Its Sequential Read throughput came out to 295 kilobytes per second, and it played all our multimedia test files smoothly except the rigorous custom AVI file, where it dropped over 90 percent of the video frames and suffered from audio breaks.

► **Megamedia SS20.** List price: \$379. Megamedia Computer Corp., 1701-D Fortune Dr., San Jose, CA 95131; 800-634-2633, 408-428-9920; fax, 408-428-9924.

Circle 450 on reader service card

Ocean Information Systems Inc.

• Vienna

BY BEN MILLER

Intended for the home user, the Vienna offers a disappointing combination of poor performance and inadequate documentation. For its list price of \$375 (\$350 street price) you get either a double-speed Mitsumi FX001D or Sony CDU-33A drive (which was an Editors' Choice recipient in "CD-ROM Drives: Going Mainstream," *PC Magazine*, February 22, 1994) CD-ROM drive, an Octel MV-16 sound card, and a pair of Midi Land powered speakers. Our kit came with the Mitsumi drive and a collection of CDs consisting of Mavis Beacon Teaches Typing, Compton's Interactive Encyclopedia, Chessmaster 2100, Chessmaster 4000, RoboCop 3, and some shareware games. The kit is also

offered with a different selection of CDs that consists of Chessmaster 3000, the Guinness Book of World Records, Monkey Island, and Mario Is Missing.

Installation was fairly straightforward thanks to a software utility that automatically detects IRQ and DMA settings for the sound board. Unfortunately the process was hampered by poor documentation, which consists of separate

manuals for the CD-ROM drive and the sound card but no description of how the components are supposed to work in concert. The speakers are provided without any documentation at all.

The Mitsumi drive showed good throughput results on our Sequential Read test but was one of only three drives to drop video frames while playing back files on our Indeo Video Compression test sequence. While the other two offenders dropped three frames each, the Mitsumi dropped 107. It was also one of the worst performers when playing back our custom AVI file.

The Octek MV-16 sound card also performed poorly, showing good frequency response but a low signal-to-noise ratio and high total harmonic distortion. On our subjective tests, the sound was weak and muddy, with significant background noise. Another point against the Vienna: The Octek card comes with an FM synthesizer and has no wavetable upgrade option. Like most speakers we tested for this roundup, the Midi Lands produced a tinny sound with poor bass response.

► **Vienna.** List price: \$375. Ocean Information Systems Inc., 688 Arrow Grand Circle, Covina, CA 91722; 800-325-2496, 818-339-8888; fax, 818-859-7668.

Circle 451 on reader service card



Ocean Vienna.

Multimedia Upgrade Kits

Plextor

● 4PLeX Sound Chaser

BY ROB SCHENK

If you're looking for serious processing power for video-intensive business applications and game titles, Plextor's 4PLeX Sound Chaser multimedia kit (\$749 list price, \$689 street) will satisfy. The quadruple-speed CD-ROM drive is up to the most grueling throughput tasks. Multimedia authors, however, should beware the kit's poor sound quality when recording.

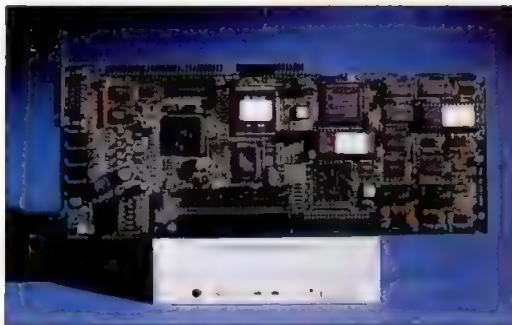
The Sound Chaser features the Adaptec Mockingbird SCSI-2 audio host adapter and Plextor's own internal PX-43CH quadruple-speed CD-ROM drive. The full SCSI audio host adapter lets you connect up to seven high-performance, high-capacity SCSI drives or other storage devices to accommodate large multimedia files. It also provides BIOS boot support, which lets you boot off another hard disk. The board features Analog Devices' 2115 DSP and includes integrated wavetable and FM synthesis (OPL-2). The wavetable sounds are good, with 32 polyphonic and 32 multi-timbral sounds supported. Microsoft Sound System 2.0 software is included in the box, but the kit does not come with speakers or CDs.

The Plextor CD-ROM drive's performance was stellar, consistently finishing at or near the top during our testing. The drive's 1MB buffer improves video and graphical performance. Clocking in just shy of true quadruple-speed throughput (594 kilobytes per second), multimedia applications appeared smooth and fluid on-screen and looked better than on other machines in this roundup. The drive also performed splendidly on our demanding Multimedia Playback test, one of only two drives not to drop a single frame (the Sound Blaster Digital Edge 3X's NEC MultiSpin 3Xi drive was the other).

On the Digital Recording and Playback test, however, the kit faltered. The Adaptec sound card displayed a subpar signal-to-noise ratio (57.5 dBr, the third worst in this review) and very poor frequency response. Its THD+N performance was also a poor 0.224 percent,

above the acceptable mark of 0.1 percent. Digital Playback scores were also poor, but on subjective tests, playback of our programmed digital files sounded better than files recorded on the same card.

Installation of the Plextor kit was painless. Software installation was simple, using Adaptec's easily navigable DOS-based install program. The documentation was clear and the illustrations aided



Plextor 4PLeX Sound Chaser.

the installation process, although an index would be helpful.

► **4PLeX Sound Chaser.** List price: \$749. Plextor, 4255 Burton Dr., Santa Clara, CA 95054; 800-886-3935, 408-980-1838; fax, 408-986-1010.

Circle 452 on reader service card

Reveal Computer Products



BY JAE YANG

An Editors' Choice, the Quantum multimedia upgrade kit from Reveal Computer Products is the most comprehensive package in this roundup, and quantity was not achieved at the expense of quality. The \$599 (street price) package includes Reveal's SoundFX Wave 32 sound board; a Panasonic 563 CD-ROM drive; a microphone, headset, joystick, and two 40-watt speakers; and a generous 35 CD-ROM titles (including Return to Zork, Microsoft Works Multimedia Edition, Iron Helix, and The 1993 Guinness Multimedia Disc of Records).

The main attraction of this package is the SoundFX Wave 32 sound board with Ensoniq's Soundscape wavetable synthesis chip set. In general, the board scored better than average on our audio perfor-

mance tests. The frequency response curve in both the analog and the digital domains was fairly close to ideal flatness, and the signal-to-noise ratio was a respectable 72 dBr. Because of the board's signal characteristics, however, we noticed that waveform files we recorded sounded faint and slightly degraded when played back. On the positive side, the Soundscape chip set produced arguably the best wavetable sounds of the group.

The Panasonic CD-ROM drive is based on a custom Reveal mechanism (the board can support Panasonic, Mitsumi, or Sony drives). It was one of the best performers among the double-speed drives we examined. The Panasonic drive's throughput numbers were strong, and it did better than most on our grueling custom AVI file, dropping 103 video frames.

What really sets this kit apart from the others are the Reveal RS380 speakers, with 40 watts per channel. This multidriver system, with a tweeter and woofer, can power-up to output close to 100 dBspl of sound with a total harmonic distortion plus noise value of less than 10 percent. Unlike most of the other bundled speakers we listened to, the frequency response of these speakers showed good bass output. You won't mistake the sound for that of your home system, but the speakers were clearer and had more kick than others in this roundup.

Multimedia authors may be put off by the slight imperfection in the recording and playback of digital audio, but a wealth of features and superior components make this the most complete multimedia upgrade kit in this roundup.

► **Quantum.** Estimated street price: \$599. Reveal Computer Products, 6045 Variel Ave., Woodland Hills, CA 91367; 800-326-2222, 818-704-6300; fax, 818-340-9957.

Circle 453 on reader service card



Reveal Quantum.

Blast thru the FM sound barrier

with *SOUND Canvas*™

DB

Only \$229!

Upgrade your FM sound card* to wavetable sound with Roland's new Sound Canvas DB™ Articulated-Wave™ snap-on-card. Made possible by Roland's proprietary RS PCM technology and world-class sound library, this new card gives you sound far beyond even the most advanced wavetable sound cards! Includes \$99 software with DoReMiX™, Easy Juke™, and over 100 songs (3 hours & 45 minutes of copyright-free music in Standard MIDI File format). A \$328 value! Go find Sound Canvas DB at your local computer store or call 800-386-7575 and select 2 to receive an exciting, full-color brochure.

Roland®

CIRCLE 047 ON READER SERVICE CARD

Roland Corporation U.S.
7200 Dominion Circle
Los Angeles, CA 90040-3696
Phone (213) 685-5141
FAX (213) 722-0911

Roland Canada Music Ltd.
5480 Parkwood Way
Richmond, B.C., V6V 2M4
Phone (604) 270-6626
FAX (604) 270-6552

*Sound Blaster™ 16, Sound Galaxy Pro™ 16, and other FM sound cards with compatible connector.
© Roland Corporation U.S. 1994. All other trademarks are the property of their respective owners.

Multimedia Upgrade Kits

Sigma Designs Inc.

● ReelMagic CD-ROM Upgrade Kit

BY ROB SCHENK

The \$799 (\$699 street price) Sigma Designs ReelMagic CD-ROM Upgrade Kit looks ahead to the next generation of multimedia technology. The ReelMagic board incorporates MPEG video decompression along with its sound features, making it possible to view full-screen, full-motion video games and feature films on CD. The version we looked at had no MIDI, audio, or microphone input ports, taking it out of contention for MIDI users and multimedia authoring. Game users should also note that the ReelMagic board has no joystick port. Sigma Designs reports that a newer version, due out by the time you read this, will have line-in, mike, and joystick/MIDI ports.

The kit features the ReelMagic sound card, a Sony CDU-33A double-speed CD-ROM drive (an Editors' Choice winner in our February 22, 1994 roundup), and a pair of 3.5-watt speakers. The kit also ships with four bundled CDs: Compton's Interactive Encyclopedia, The Horde, Return to Zork, and an MPEG-compressed version of the movie *Top Gun*. The quality of the MPEG video playback was excellent; only slight posterization could be noticed even at full-screen size.

On our CD-ROM Drive tests, the Sony drive gave a solid performance: It clocked in at near double-speed throughput (295 kilobytes per second) and showed good synchronization of video and audio. The drive, which uses Sony's proprietary interface, dropped 32 of 226 frames in our custom AVI file, an above-average score. The kit's overall sound quality was crisp, and indeed the card turned in strong results on our playback tests. THD+N was a low .069 percent, and quantization noise was a respectable 69.1 dB. However, it comes with an FM synthesizer. No wavetable upgrade is available, and the WS-35 speakers are below average, offering poor bass response and high harmonic distortion levels.

The kit's installation was relatively simple, but the ReelMagic board has to be

attached directly to a VESA-compliant VGA graphics card via a feature connector. Most video cards have this connector; Sigma Designs maintains a list of incompatible products. The DOS-based installation software and customization of DMAs and IRQs was straightforward. The manual was concise and well-written but lacked an index.

This kit is a pricey option for games-only users, and MIDI fans will miss wavetable

offset by the relatively poor quality of the sound card, Tiptek's own Golden Sound Pro 16 Plus. The board performed adequately on our Digital Playback test, but quantization noise on our Digital Recording and Playback test was poor. A low background hiss was noticeable, and poor looping made the MIDI instruments' notes end abruptly rather than taper off naturally. Also, left and right channels were crossed on the board.

The sound card's audio capabilities are implemented through Tiptek's proprietary digital signal processor (DSP) and include integrated wavetable and FM synthesis, using Yamaha's OPL4 chip. Here again, sound quality was not great.

The Panasonic CR-533B CD-ROM drive, which has a SCSI-2 interface, achieved near double-speed throughput (294 kilobytes per second) and showed good synchronization of audio and video. The drive dropped 72 out of 226 frames when playing our rigorous custom AVI file, an above-average showing. The 7-watt Midi Land CP28 speakers, however, elicited a weak bass response. Tiptek offers 120-watt speakers for an additional \$129 (about \$80 street).

Bundled software is one of the kit's strengths. In addition to the CDs (including notable titles such as Battle Chess, Microsoft Bookshelf, The Software Toolworks Multimedia Encyclopedia, and XF5700 Mantis Fighter), the kit ships with a complete set of DOS-based applications, as well as 11 Windows-based applets. These programs help you create simple multimedia files and a database of MIDI and .WAV files.

Hardware installation is straightforward, and the DOS-based software installation allows for easy customization of IRQs and DMAs. Documentation offers helpful illustrations but could be im-



Sigma Designs ReelMagic CD-ROM Upgrade Kit.

synthesis. But if full-screen video (and keeping ahead of the Joneses) is important to you, take a look at ReelMagic.

► **ReelMagic CD-ROM Upgrade Kit.** List price: \$799. Sigma Designs Inc., 46501 Landing Pkwy., Fremont, CA 94538; 800-845-8086, 510-770-0100; fax, 510-770-2640.

Circle 454 on reader service card

Tiptek Technology Inc.

● Tiptek Multimedia Advanced Upgrade Kit

BY ROB SCHENK

Priced at \$899 (\$799 street price), the Tiptek Multimedia Advanced Upgrade Kit offers more features and more CD titles than do most of the kits in this roundup. On the surface, the bundle appears ideal for all users: Games players get a joystick port and Sound Blaster-compatibility; business users get easy installation and Microsoft Sound System-compatibility; and MIDI fans get wavetable synthesis and an optional Yamaha YS225 echo effects processor (\$89). If the sound quality were up to par, the kit would be easy to recommend. At this price, though, better components can be had.

The kit's wealth of features is



Tiptek Multimedia Advanced Upgrade Kit.



THUNDERBOLT P90

112

WINSTONE 84



Intel Pentium PCI/VLB Motherboard
16MB RAM w/256K Write Back Cache
730MB IDE Drive w/128K Cache
2X CD ROM Drive/1.44MB Floppy Drive
64 bit W32P PCI Graphics w/2 MB
32-Bit "Mode 3" Enhanced IDE Interface
UART 16550 Fast Serial Ports
ECP/EPP Enhanced Parallel Port
Optiquist 2000 DS 15" NI Green Monitor
MS DOS & Windows For WorkGroups
Jurassic Park Multimedia Screen Saver

Intel® Pentium™ 90 \$2999
(Tested 112 on Winstone 84)

with 8MB RAM, 540MB, 1MB Video

Intel® Pentium™ 80 \$2289

ATI Mach 64 w/2MB Upgrade \$235.00
Orchid GameWave DSP Wavetable Sound \$95.00
1GB IDE HD Upgrade From 730MB HD \$230.00
Call for More Upgrade Options

SOLID 3 YEAR PARTS & LABOR WARRANTY



AWARDED BEST SERVICE & QUALITY BY

PC WORLD

PC WORLD

December 1993

SPECIAL WORLDWIDE PARTNERSHIP

**PROGRAM OFFERED TO VARS
& CORPORATIONS**

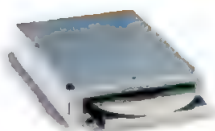


THUNDERBOLT POWER

BY

TAGRAM
System Corporation

**FREE
4X
CD ROM
UPGRADE**



For First 500 Thunderbolt P90 October Buyers!

HURRY UP! YOUR LAST CHANCE!

TEAC.



June 28, 1994
Tagram Thunderbolt XL

THUNDERBOLT XL

94.2

WINSTONE 84



Intel OverDrive Ready VLB Motherboard
8MB RAM w/256K Write Back Cache
420MB IDE Drive w/128K Cache
2X CD ROM Drive/1.44MB Floppy Drive
16 Bit Sound Blaster Compatible Stereo Card
1 MB Flash BIOS/PCI Upgradable
32-Bit W32P VL-Bus Graphics w/1 MB
32-Bit "Mode 3" Enhanced IDE Interface
UART 16550 Fast Serial Ports
ECP/EPP Enhanced Parallel Port
Optiquist 2000 DS 15" NI Green Monitor
Power Amplified Speakers
MS DOS & Windows For WorkGroups
Jurassic Park Multimedia Screen Saver

Intel® 486™ DX2-66 \$1799

with 10MB RAM, 540MB, 2MB Video

Intel® 486™ DX4-100 \$2499

(Tested 94.2 on Winstone 84)

TAGRAM
System Corporation

"Ask what we can do for you"



T A G R A M S
800-824-7267

Free Access to 24 Hour BBS • 3 Years P & L Warranty • 30 Day Money Back Guarantee • Toll Free Technical Support
1451-B Edinger Ave., Tustin, Ca 92680 • Tel: 714-258-3222 Fax: 714-258-3220 • BBS: 714-258-7118
Mon. - Fri.: 7am - 6pm Sat.: 9am - 4pm (P.S.T.) • GSA Contract #: GS00K94AGS

The Intel Inside Logo is a registered trademark of Intel Corporation. All trademarks and tradenames herein are properties of their respective owners. Price, specification and terms are subject to change without notice. 30-day money back guarantee does not include shipping and handling charge, opened software and special orders. PO's, APO and FPO orders are accepted.

CIRCLE 008 ON READER SERVICE CARD

INTRODUCING THE FUTURE OF GRAPHICS

"Visual Reality is a treasure trove of 3D graphics, rendering tools, models, images, and image manipulation tools...it may well be all you'll ever need. Highly recommended."

Windows Sources - August, 1994

"The CorelDRAW! of 3D software."

Corel Corp. Infoletter! - July, 1994

"Flexible, powerful, and a dream to use."

PC Home - July, 1994

"Extremely user friendly...incredibly addictive"

PC Home - July, 1994

"What you can accomplish with this software is limited only by your imagination."

Circuits - July, 1994

"Visual Reality can do more with 3D Images than anything else you can buy."

Publish - August, 1994

"Visual Reality, you can bet it will soon find its way on many desktops."

PC Magazine - May, 1994

Introducing

VISUAL REALITY

Available at:
**EGGHEAD
SOFTWARE**

Image Credits: (top & background) Frederic Bertrand, Compugraf, Brussels, Belgium;
(middle) Vytautas Grizaitis, Avocet Design;
(bottom) Steven Anderson, 3D Works, Inc.

The first product that lets you go beyond your 2D drawing tools. Everything you need to create astonishing 3D imagery and animations is included: 4 Applications, and 2 CDs filled with over 1,500 2D textures and 3D objects. All for \$595.

Call 800-669-7318 U.S. & CANADA

For OEM Sales Call 818-593-3500, Ext. 225
For International Sales Fax +44 481 714 573

Visual Software Inc., Woodland Hills, CA 91364
(818) 883-7900 • Fax (818) 593-3797



Circle 173 on Reader Service Card



Multimedia Upgrade Kits

proved by adding an index.

The Megamedia SS20 comes with Voyetra Technologies' Audiostation, which lets you play audio CDs and manage the recording and playback of MIDI sequences. Also included is Midisoft's Recording Session for Windows and a MIDI cable.

Another option is the \$69 Golden Sound Surround Kit, which has a chip that you can plug into an on-board socket to get four-way speaker sound. The chip splits the signal four ways so that the back two speakers are delayed. The street price is about \$45.

► **Toptek Multimedia Advanced Upgrade Kit.** List price: \$899. Toptek Technology Inc., 14140 Live Oak Ave., Baldwin Park, CA 91706; 800-416-8889, 818-960-9211; fax, 818-960-0703.

Circle 455 on reader service card

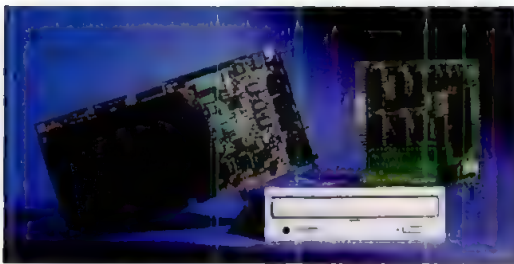
Turtle Beach Systems

EDITORS' CHOICE

MultiSound Monterey Multimedia Upgrade Kit

BY JOHN R. QUAIN

The intended audience for Turtle Beach's MultiSound Monterey Multimedia Upgrade Kit is clear: serious-minded MIDI users and those who want high-fidelity sound for multimedia authoring work. The package, which sells at a street price of about \$799, does not include a microphone or speakers and is not compatible with the Sound Blaster, Ad Lib, or Mi-



Turtle Beach MultiSound Monterey Multimedia Kit.

crosoft Windows Sound System standards. All you get is Chessmaster 3000, Jasmine Multimedia, the New Grolier Multimedia Encyclopedia—and the finest sound quality of all the kits we tested.

Using an on-board Motorola 56001 processor, the Monterey features Turtle Beach's unique Hurricane architecture, which uses a high-speed on-board DSP to

avoid the use of a DMA channel—the only board in this review to do so. This gives the Monterey a distinct performance advantage, allowing you to record long samples without slowing down the entire system (though you have to relinquish 32K of upper memory to it).

On our sound board frequency response test, the Monterey board remained steady throughout the entire audible range, yielding the flattest response curve we saw. It also had the lowest total harmonic distortion plus noise value and best channel separation results of all the boards we tested, offering the clearest and most faithful sound reproduction we heard.

MIDI enthusiasts should note that Turtle Beach has replaced the 384-instrument E-Mu Proteus 1XR wavetable with a 188-instrument WaveFront wavetable synthesizer put out by its parent company, Integrated Circuit Systems. The ICS wavetable doesn't quite match the quality of the E-Mu design: The piano is quite good, but the horns are unrealistic. Still, it surpasses most of the other wavetables we tested, and the basic MIDI sequencer software lets you adjust effects and record compositions.

The kit's Sony CDU-33A CD-ROM drive (Editors' Choice, *PC Magazine*, February 22, 1994) has a tray design and uses a proprietary 8-bit controller card. The tray can be convenient, but the controller means relinquishing yet another expansion slot—the sound card has no CD-ROM or SCSI interfaces. The drive's performance was better than average overall.

Turtle Beach does bundle a version of Compel, the multimedia business presentation authoring tool from Asymetrix Corp., on its Jasmine Multimedia CD. Newcomers to multimedia applications development will appreciate Compel's fine on-line tutorial. The Turtle Beach kit makes no apologies to business users. It achieves what it sets out to do: deliver the best sound available on a PC. □

► **MultiSound Monterey Multimedia Upgrade Kit.** List price: \$899. Turtle Beach Systems, 52 Grumbacher Rd., York, PA 17402; 800-645-5640, 717-767-0200; fax, 717-767-6033.

Circle 456 on reader service card

VB Power



ISBN: 1-56276-073-4
Price: \$34.95

This innovative guide by Dan Appleman turns

Visual Basic programmers

into power users by

illuminating the tools of

the Windows Application

Program Interface (API).

Includes a time-saving disk

that contains source code

from the examples in the

text, plus a specially

designed dynamic link

library (DLL).



Available at fine bookstores, or call

1-800-688-0448
ext. 8448

© 1993 Ziff-Davis Press

COREL

FLOW™

Quick and Powerful Diagrams!

CorelFLOW is the fast, easy way to organize and communicate your ideas with flowcharts, diagrams, schematics and more!



Incredible value!

- 2,000 Symbols
- 1,000 Clipart Images
- 1,000 Corel Photos on CD-ROM
- 100 TrueType Fonts

Easy to use!

- "Drag and drop" drawing
- Automatic shape connectors
- Direct text and line editing
- Customizable workspace

Powerful!

- OLE 2.0 support
- Customizable Smart Symbol Libraries
- Application and diagram linking
- Access multiple Smart Symbol Libraries
- Automatic resizing of symbols to fit text
- Flexible object manipulation
- Built-in spellchecker



Great Prices. No Pressure.

Suggested List Price
\$99
Dealer may sell for less!

*U.S. Funds plus applicable taxes.

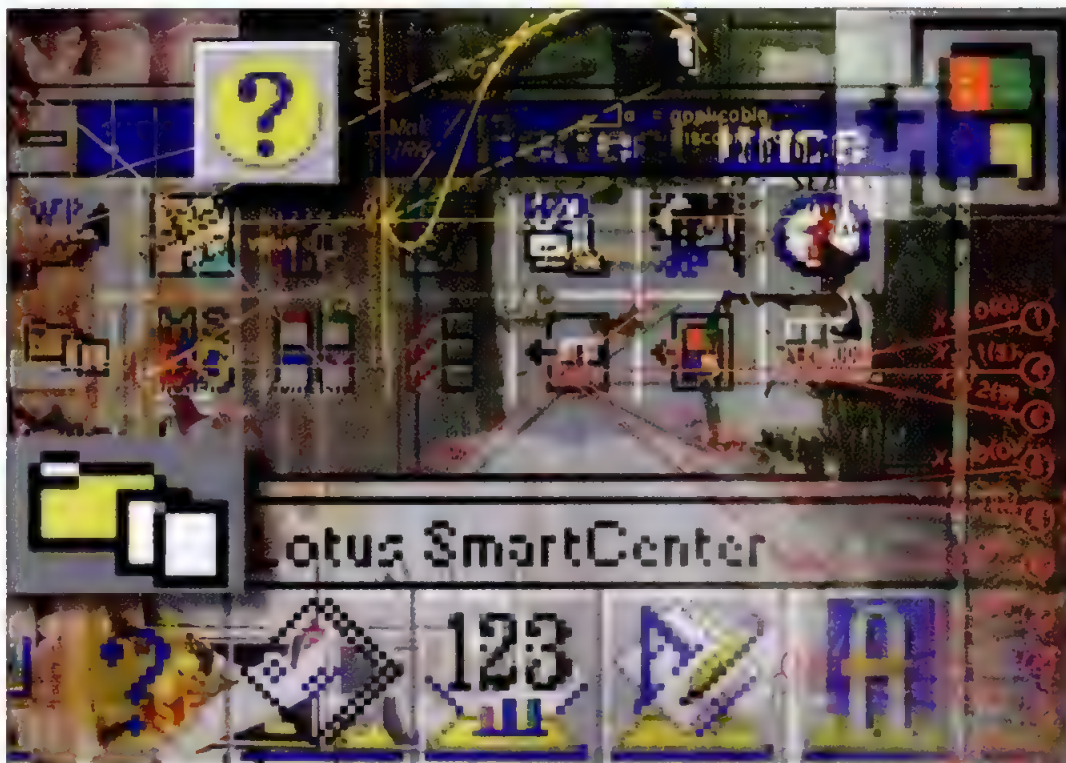
Visit the location nearest you!



CIRCLE 020 ON READER SERVICE CARD

DESKTOP APPLICATIONS

Are They Suites Yet?



Word processors, spreadsheets, and databases have come a long way, but are today's suites integrating them effectively?

By Michael J. Miller

It's no exaggeration to say that the business software market has been transformed over the past two years. The major vendors used to compete with standalone word processors, spreadsheets, graphics programs, and databases, but now the most competitive segment of the market comprises integrated application suites that attempt to offer all the major functions most business users need.

In the Windows arena, only three players have the critical mass necessary to play in the suite market—Lotus Development Corp., Microsoft Corp., and WordPerfect—now a division of Novell. In fact, the need to compete was a major reason behind Novell's recent acquisition of both WordPerfect and Borland International's Quattro Pro spreadsheet. Computer

IN THIS REVIEW

What's in the Suites	160	Spreadsheets	192
Highlights	161	Databases	193
Word Processors	162	Performance Tests:	
Performance Tests:		Databases	205
Word Processors	179	Suite Little Extras	206
Spreadsheets	181	Highly Presentable Graphics	206
Performance Tests:		Suite Integration	211



Word Processors

INTRODUCTION AND REVIEWS BY EDWARD MENDELSON

Automated documents are the future of word processing—at least this is what Lotus, Microsoft, and WordPerfect want you to believe. Packages in the latest generation of word processors automatically correct errors, format text, and keep workgroup members abreast of edits.

Automated word processing came into its own in 1993, when Microsoft Word for Windows, Version 6.0, incorporated on-the-fly correction, intelligent text formatting, and Wizards that automatically built customized documents according to a user's specifications.

WordPerfect 6.0a for Windows now matches most of these features. Ami Pro for Windows 3.1 does not, but it does include links to Lotus Notes, which notify workgroup members when collaborative documents have undergone edits.



HANDSOME IS AS HANDSOME DOES

Along with convenience, automation adds heft. A full installation of an up-to-date Windows word processor consumes between 18MB and 28MB of disk space, and you'll often get sluggish performance if you run one of these with less than 8MB of RAM.

One reason the programs are so large is that their designers have tried

to accomplish two contradictory tasks at once. On the one hand, they've built spreadsheet, graphics, charting, and database features into each program. On the other, they've worked to incorporate OLE 2.0, so you can use the tools of separate applications to handle nontext tasks without leaving the word processor's editing screen. For the moment, only Word for Windows truly lets you have it both ways, but OLE 2.0 is due to arrive in WordPerfect with Version 6.1—scheduled for release around press time.

Every word processor includes at least minimal file management functions to let a user delete or copy files without leaving the program. WordPerfect pioneered full file indexing

Packages in the latest generation of word processors automatically correct errors, format text, and keep workgroup members abreast of edits.

Word Processors:

• Microsoft Word for Windows 6.0a

All three major Windows word processors are dazzlingly powerful, highly automated, and easy to use, but Microsoft Word for Windows, Version 6.0a, stands above its rivals with its elegance, flexibility, and cohesive and intelligent interface.

Word for Windows does more to ease the job of creating, editing, and sharing documents than any of its competitors. Its lucid format menus; flexible, automated correction and formatting features; and intuitive outlining and well-designed screen make it a pleasure to use. Though slower than earlier versions, the program has adequate speed for today's hardware. The latest revision, 6.0c (in beta at the time of our testing), adds supports for Notes/FX and an OLE-enabled image-editing module with built-in scanner support.

Word for Windows doesn't dominate in all areas. The file management and indexing fea-

tures of WordPerfect 6.0a for Windows still surpass anything in other applications. WordPerfect also organizes large documents more effectively than Word for Windows can. WordPerfect suffers from a clumsy interface and failure to organize its myriad features into a coherent whole, but if your word processing needs require raw strength more than elegance, WordPerfect has muscles to spare.

Ami Pro for Windows, Version 3.1, with its tight integration of graphical functions and frames, handles graphics particularly well. It also offers close integration with Lotus Notes.

and advanced built-in file management. Microsoft plans to build such features into its forthcoming version of Windows, code-named Chicago. Until this comes to pass, however, WordPerfect has a major advantage.

In the shadow of the general-use powerhouses that dominate word processing, several specialist programs continue to evolve: The Technology Group's Nota Bene and XyWrite (for efficient text entry), Gamma Production's UniVerse (for multiple languages, including Chinese and Japanese), and Brooks/Cole's EXP and Personal TeX's PC TeX (for scientific use). The future looks brighter than ever for anyone who wants to create complex documents.

Lotus Development Corp.

• Ami Pro for Windows 3.1

Ami Pro for Windows, Version 3.1, adds impressive workgroup functions to Lotus's Windows-based word processor, but the package's text and graphics features remain largely unchanged since Version 3.0 appeared in 1992. This doesn't mean that Microsoft Word for Windows and WordPerfect for Windows, each with shiny new 6.0a versions, have moved a full

PerfectOffice 3.0 for Windows, Professional Edition

WordPerfect, The Novell Applications Group, 1555 N. Technology Way, Orem, Utah 84057-2399; 800-451-5151, 801-225-5000.

List price: \$859; upgrade, \$399. Standard Edition, \$659; upgrade, \$299. Requirements: 4MB RAM, 114MB hard disk space (preliminary), Microsoft Windows 3.1 or later.

**Includes:**

- WordPerfect 6.1 for Windows;
- Quattro Pro 6.0 for Windows, Workgroup Edition;
- Paradox 5.0 for Windows, Workgroup Edition;
- Envoy 1.0a for Windows;
- GroupWise 4.1a for Windows;
- InfoCentral 1.1 for Windows;
- Visual AppBuilder 1.0 for Windows;
- WordPerfect Presentations 3.0 for Windows.

Circle 482 on reader service card

ALTERNATIVE SOLUTIONS

Alternatives to OLE include OpenDoc, a competing standard promulgated by Component Integration Labs (CIL) and supported by Apple Computer, IBM Corp., Taligent, WordPerfect, and others. CIL says OpenDoc is smaller and easier to implement, and that it allows for multiple simultaneous active windows and works better over a network. But at this point there are no shipping OpenDoc apps. OpenDoc supporters seem to be motivated in large part by the fact that the standard won't be controlled by Microsoft.

WordPerfect has been one of the prime movers working on making OpenDoc developer kits available for Windows and pushing for interoperability with OLE, but in PerfectOffice 3.0 for Windows, it has developed OLE-based, not OpenDoc-based, applications—in part because OLE was the only standard available. The company says OpenDoc versions will follow. Lotus has recently

joined CIL but has indicated it will create OLE-based applications first. (For additional details on OLE and OpenDoc, see "Putting It Together," February 8, 1994).

Novell's AppWare provides a different method for integration. It's designed to facilitate corporate creation of net-

worked applications using larger applications as building blocks. The professional version of PerfectOffice 3.0 for Windows is slated to contain AppWare Loadable Modules for controlling its components, as well as Visual AppBuilder for tying these parts together.

Lotus, Microsoft, and WordPerfect have made progress, but the seamlessly integrated suite still seems a version or two away.

With all of these technologies either in their first iterations or still in development, it's not surprising that there are still plenty of areas in which suite integration can improve. So how well have Lotus, Microsoft, and WordPerfect succeeded at making their products work together as suites? All three have made progress, but in each case, the seamlessly integrated suite still seems a version or two away.

HIGHLIGHTS**Desktop Application Suites****WORLD-CLASS APPLICATIONS**

form the core of each of the three suites we review here. The word processors, spreadsheets, databases, and presentation-graphics packages that make up these products have deeper feature sets, more built-in intelligence, a wider variety of automated help agents, and greater ease of use than any collection of packages we've seen. They don't outclass their predecessors in performance, however.

INTEGRATION is at best a slow process. The promise of seamless interoperability that suite products clearly held out when we first reviewed them eight months ago has

been slow to mature. Vendors have made progress, but there's still a way to go.

VERSATILE LANGUAGES

that connect applications and synergize their individual strengths are a part of each vendor's stated integration vision. So far, however, only Microsoft has even begun to deliver on this promise. Excel 5.0 contains the first implementation of Microsoft Visual Basic, Applications Edition. Lotus's LotusScript and WordPerfect's PerfectScript, while allegedly nearing readiness, are not yet available to end users.

OLE (Object Linking and Embedding) 2.0 is the hottest integration

tool going. Microsoft, which created the specification for this programming magic, was the first to market OLE when it shipped a pair of fully OLE-compliant applications, Word for Windows 6.0 and Excel 5.0. Both Lotus and WordPerfect are jumping on the OLE 2.0 bandwagon in a big way: Lotus's OLE efforts are focused on the connection between Approach and 1-2-3, and WordPerfect's PerfectOffice promises to provide more complete OLE 2.0 support than anything we've seen thus far. Its Paradox 5.0 component already stands as the first database product to function as both an OLE client and a server.



Word Processors

INTRODUCTION AND REVIEWS BY EDWARD MENDELSON

Automated documents are the future of word processing—at least this is what Lotus, Microsoft, and WordPerfect want you to believe. Packages in the latest generation of word processors automatically correct errors, format text, and keep workgroup members abreast of edits.

Automated word processing came into its own in 1993, when Microsoft Word for Windows, Version 6.0, incorporated on-the-fly correction, intelligent text formatting, and Wizards that automatically built customized documents according to a user's specifications.

WordPerfect 6.0a for Windows now matches most of these features. Ami Pro for Windows 3.1 does not, but it does include links to Lotus Notes, which notify workgroup members when collaborative documents have undergone edits.

HANDSOME IS AS HANDSOME DOES

Along with convenience, automation adds heft. A full installation of an up-to-date Windows word processor consumes between 18MB and 28MB of disk space, and you'll often get sluggish performance if you run one of these with less than 8MB of RAM.

One reason the programs are so large is that their designers have tried

to accomplish two contradictory tasks at once. On the one hand, they've built spreadsheet, graphics, charting, and database features into each program. On the other, they've worked to incorporate OLE 2.0, so you can use the tools of separate applications to handle nontext tasks without leaving the word processor's editing screen. For the moment, only Word for Windows truly lets you have it both ways, but OLE 2.0 is due to arrive in WordPerfect with Version 6.1—scheduled for release around press time.

Every word processor includes at least minimal file management functions to let a user delete or copy files without leaving the program. WordPerfect pioneered full file indexing

Packages in the latest generation of word processors automatically correct errors, format text, and keep workgroup members abreast of edits.



Word Processors:

• Microsoft Word for Windows 6.0a

All three major Windows word processors are dazzlingly powerful, highly automated, and easy to use, but Microsoft Word for Windows, Version 6.0a, stands above its rivals with its elegance, flexibility, and cohesive and intelligent interface.

Word for Windows does more to ease the job of creating, editing, and sharing documents than any of its competitors. Its lucid format menus; flexible, automated correction and formatting features; and intuitive outlining and well-designed screen make it a pleasure to use. Though slower than earlier versions, the program has adequate speed for today's hardware. The latest revision, 6.0c (in beta at the time of our testing), adds supports for Notes/FX and an OLE-enabled image-editing module with built-in scanner support.

Word for Windows doesn't dominate in all areas. The file management and indexing fea-

and advanced built-in file management. Microsoft plans to build such features into its forthcoming version of Windows, code-named Chicago. Until this comes to pass, however, WordPerfect has a major advantage.

In the shadow of the general-use powerhouses that dominate word processing, several specialist programs continue to evolve: The Technology Group's Nota Bene and XyWrite (for efficient text entry), Gamma Production's UniVerse (for multiple languages, including Chinese and Japanese), and Brooks/Cole's EXP and Personal TeX's PC TeX (for scientific use). The future looks brighter than ever for anyone who wants to create complex documents.

Lotus Development Corp.

• Ami Pro for Windows 3.1

Ami Pro for Windows, Version 3.1, adds impressive workgroup functions to Lotus's Windows-based word processor, but the package's text and graphics features remain largely unchanged since Version 3.0 appeared in 1992. This doesn't mean that Microsoft Word for Windows and WordPerfect for Windows, each with shiny new 6.0a versions, have moved a full

tures of WordPerfect 6.0a for Windows still surpass anything in other applications. WordPerfect also organizes large documents more effectively than Word for Windows can. WordPerfect suffers from a clumsy interface and failure to organize its myriad features into a coherent whole, but if your word processing needs require raw strength more than elegance, WordPerfect has muscles to spare.

Ami Pro for Windows, Version 3.1, with its tight integration of graphical functions and frames, handles graphics particularly well. It also offers close integration with Lotus Notes.

DELL LATITUDE XP
INTEL® X4 75MHz SYSTEM

\$3399

- BUSINESS LEASE: \$126/MO.
- 9.5" DUAL SCAN STN COLOR
 - 8MB RAM (36MB MAX RAM)
 - 340MB HARD DRIVE
- ORDER CODE #600011



7 ports on our Advanced Port Replicator (complete with Ethernet 10Base-T and SCSI-2) virtually turns your Latitude XP into a desktop for only \$199

524MB of hard drive space is available. Need we say more?

A 3.3 volt processor consumes fewer watts and pumps out hours of power so you can cruise.

8

8 hours of battery life. Yes, you read it right: 8 hours

7

6

6 lbs. of Latitude™ or 5.9 lbs. of Latitude XP and you still get 8 hours of power and 32-bit local bus video on the road

5

4

X4 100MHz processor – the fastest clock speed you can buy in a notebook, and it's available on Latitude XP systems

3

2

2 ways of getting 8 hours out of your Dell notebook: The 8-hour Smart Lithium Ion battery on the Latitude XP. Or 2 bays for two 4-hour NiMH batteries on the Latitude

Swappable hard drives

La

Advanced Port Replicator

to

1MB video RAM

VR

For
RAM, we offer **RAM expansion**
up to 36MB



THE DELL LATITUDE XP COOL, HUH?



DELL LATITUDE XP INTEL® X4 75MHz SYSTEM

\$3399

BUSINESS LEASE: \$126/MO.

- 9.5" DUAL SCAN STN COLOR
- 8MB RAM (36MB MAX RAM)
- 340MB HARD DRIVE
- NEW SMART LITHIUM ION BATTERY
- 3-YEAR LIMITED WARRANTY*
- 30-DAY MONEY-BACK GUARANTEE

ORDER CODE #600011

DELL LATITUDE XP INTEL® X4 75MHz SYSTEM

\$3699

BUSINESS LEASE: \$134/MO.

- 9.5" DUAL SCAN STN COLOR
- 8MB RAM (36MB MAX RAM)
- 524MB HARD DRIVE
- NEW SMART LITHIUM ION BATTERY
- 3-YEAR LIMITED WARRANTY*
- 30-DAY MONEY-BACK GUARANTEE

ORDER CODE #600013

DELL LATITUDE XP INTEL® X4 100MHz SYSTEM

\$4799

BUSINESS LEASE: \$173/MO.

- 9.5" ACTIVE MATRIX TFT COLOR
- 8MB RAM (36MB MAX RAM)
- 340MB HARD DRIVE
- NEW SMART LITHIUM ION BATTERY
- 3-YEAR LIMITED WARRANTY*
- 30-DAY MONEY-BACK GUARANTEE

ORDER CODE #600012

TO ORDER, CALL NOW.

800-873-1190

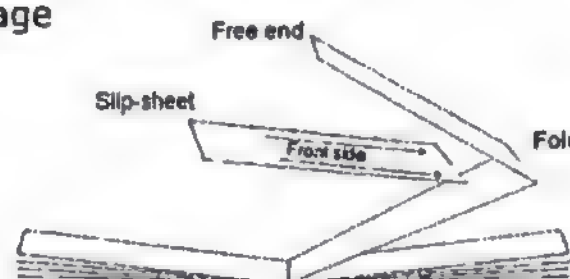
In Canada* Call 800-668-3021

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT
In Mexico City? Call 800-228-7811

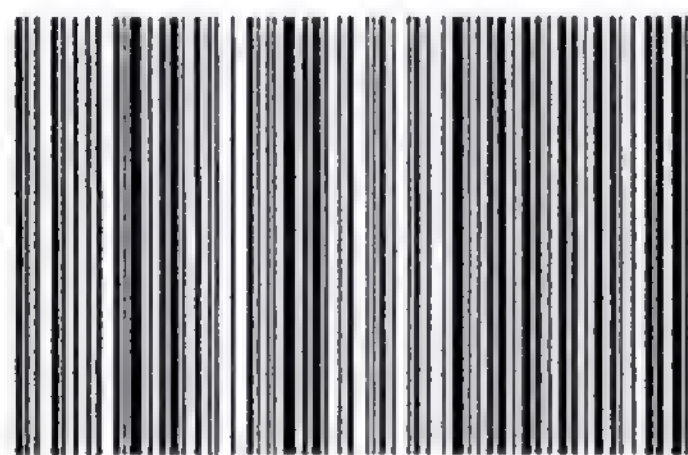
Keycode #11BPF

DELL™

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



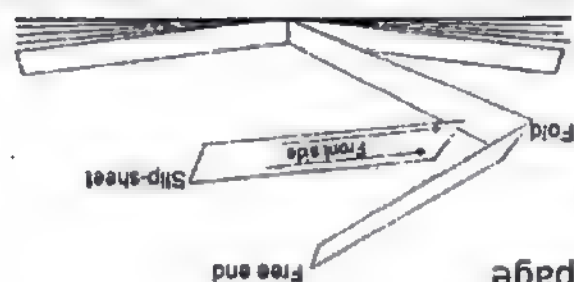
Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

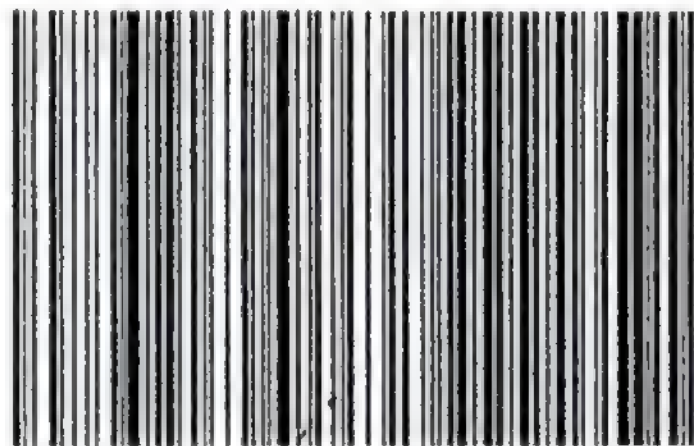
Folded edge of the page



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

1. Follow instructions on the other side

Inverted Back



GbsSlpBack-0018

Back

1. Follow instructions on the other side

#1 in the independent VeriTest Steeplechase Battery test!
In fact, the Dell® Latitude™ XP DX2/50 destroyed the previous 486 battery life record by almost 5 hours.

New record

Dell Latitude XP DX2/50
Steeplechase: 17 hrs

Typical VeriTest Steeplechase
[Testing with power management. Actual results will vary with configuration]

NEW RECORDS:	hrs:mins
Dell Latitude XP DX2/50 STN	17:05
Dell Latitude XP DX4/75 STN	16:01
Dell Latitude XP DX4/100 TFT	14:48
Dell Latitude, 2 NiMH batteries DX2/50 STN	12:15
OLD RECORD FOR 486 MONO:	12:07
IBM ThinkPad 350C (SL/25) passive	8:50
IBM ThinkPad 500 (486/slc) mono	6:30
Toshiba T4800ct (DX4/75) TFT	5:30
IBM ThinkPad 755Cs (DX4/75) passive	5:00
Compaq Contura 4/25c (SL/25) passive	4:32

The industry's only **Smart Lithium Ion battery** with a built-in microprocessor can give you 8 hours of use, without adding weight.

Latitude XP's **Smart CPU** dynamically adjusts energy consumption to the specific software application being used.

Our unique and easy-to-use **Power Management software**, along with the latest in high performance and low power components, gives you longer battery life.



DELL LATITUDE i486 SX 33MHz SYSTEM

\$1999

BUSINESS LEASE: \$74/MO.

- 9.5" DUAL SCAN STN COLOR
 - 4MB RAM (20MB MAX RAM)
 - 200MB HARD DRIVE
 - \$99 SECOND NiMH BATTERY FOR 8 HOURS
 - 1-YEAR LIMITED WARRANTY*
 - 30-DAY MONEY-BACK GUARANTEE*
- ORDER CODE #600009

DELL LATITUDE INTELDX2 50MHz SYSTEM

\$2499

BUSINESS LEASE: \$92/MO.

- 9.5" DUAL SCAN STN COLOR
 - 4MB RAM (20MB MAX RAM)
 - 340MB HARD DRIVE
 - \$99 SECOND NiMH BATTERY FOR 8 HOURS
 - 1-YEAR LIMITED WARRANTY
 - 30-DAY MONEY-BACK GUARANTEE
- ORDER CODE #600010

DELL LATITUDE INTELDX2 50MHz SYSTEM

\$2999

BUSINESS LEASE: \$111/MO.

- 9.5" ACTIVE MATRIX TFT COLOR
 - 4MB RAM (20MB MAX RAM)
 - 200MB HARD DRIVE
 - \$99 SECOND NiMH BATTERY FOR 8 HOURS
 - 1-YEAR LIMITED WARRANTY
 - 30-DAY MONEY-BACK GUARANTEE
- ORDER CODE #600019



So enter the VeriTest Steeplechase Battery test. Well, it's not a foot race, but it is a test of endurance. In the Steeplechase Battery test, the Dell Latitude XP DX2/50 system, with its built-in microprocessor battery, set a new record for 486 systems. In fact, it destroyed the previous 486 battery life record by almost 5 hours. The VeriTest Steeplechase Battery test is a standard test used by the industry to measure the battery life of laptops. To see a complete copy of the VeriTest results, call our toll-free number, 1-800-451-4646. Or, if you're a Dell Latitude XP DX2/50 system owner, you can find out how your system compares to the previous 486 battery life record by calling 1-800-451-4646. And, if you're a Dell Latitude XP DX2/50 system owner, you can find out how your system compares to the previous 486 battery life record by calling 1-800-451-4646. And, if you're a Dell Latitude XP DX2/50 system owner, you can find out how your system compares to the previous 486 battery life record by calling 1-800-451-4646.

Know it all.

When it comes to useful computer information, you *can* know it all. Only Computer Select gets it to you with speed. With convenience. And with updates every month. Subscribe now and get one month FREE!

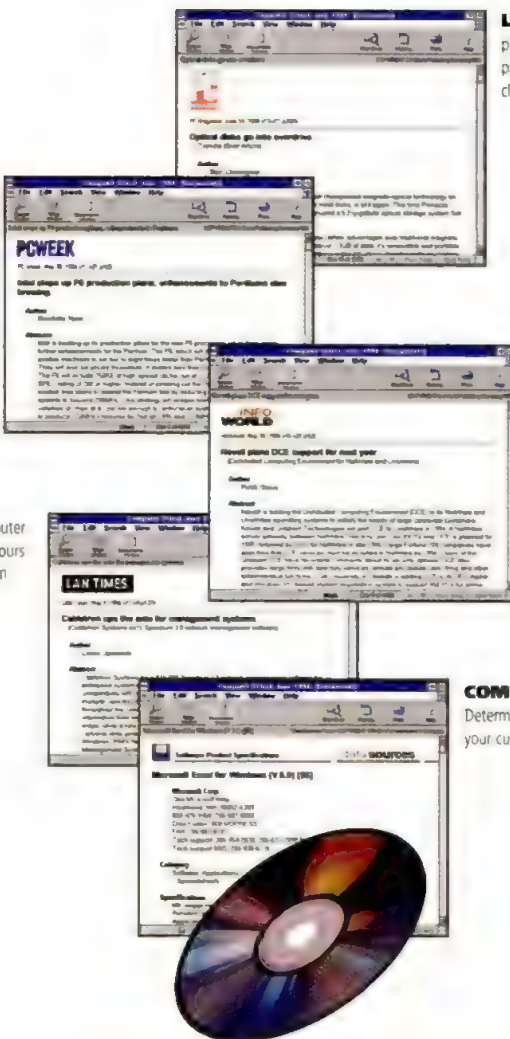
GET: Over 160 publications, 72,000 product specs and 13,000 company profiles. All the reviews and in-depth product information you'll need to help select — and justify — every purchase.

LEARN: Everything there is to know about the players in the industry. Monitor your competitor's products and business strategies; keep an eye on clients, prospects and vendors.

FIND: The opinions that count. Learn what the installed base of users and experts think about the products you're considering.

SAVE: Time and money. Put the entire computer marketplace right at your desktop, saving you hours of research so you can make the right decision in record time.

COMPARE: New products before buying. Determine whether products are compatible with your current equipment and systems.



COMPUTER SELECT

***ONE MONTH FREE! CALL 1-800-827-7889**

With Computer Select you'll have timely access to information about the industry that's always changing! The friendly search-and-retrieve software lets you search a comprehensive and complete data set to find the answers to your questions quickly and easily. Hidden gems of knowledge become accessible fast so you can make the right decisions in record time. Be a Know-It-All. Call 1-800-827-7889.

COMPUTER
LIBRARY

*Offer good in the U.S. and Canada only. © 1994 Ziff Communications Company. Outside the U.S. and Canada call: 1-212-503-4425.

CIRCLE 158 ON READER SERVICE CARD

generation ahead of Ami Pro. In fact, WordPerfect and Word for Windows have only begun to catch up with some of the layout and automation features that Ami Pro users have enjoyed for years.

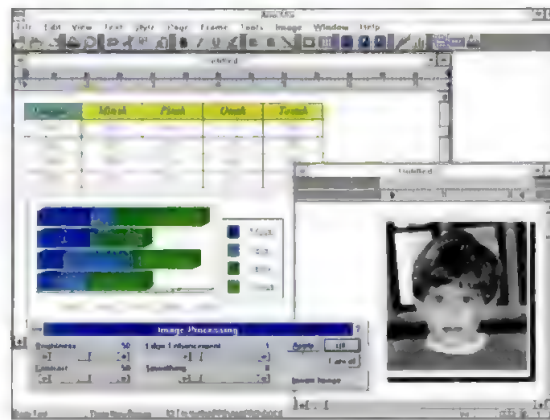
Ami Pro is less feature-heavy than its more recently upgraded rivals, but it can run more quickly on systems with limited processing power or with less than 8MB of RAM. It won't correct typing errors on the fly, nor will it let you modify elements of a paragraph's formatting without creating a new named style, but it will let you notify other Lotus Notes workgroup members whenever you finish editing a file. Like other word processors, Ami Pro is mail-enabled; it also serves as a front end for composing and sending messages from cc:Mail and Lotus Notes. Lotus says that Ami Pro can forward and reply to messages and has the ability to display attachment files in any standard format; our testing did not verify this. When you launch an Ami Pro document from Notes, a special toolbar gives you quick access to Ami Pro's standard workgroup-related features, such as annotations, on-the-fly redlining, and editorial comments on the file.

Ami Pro's automated templates are easier to build than the analogous templates in Word for Windows and WordPerfect, because a supplied macro automates the processes of creating dialog boxes for user input and building fields that automatically insert data into any document created by the template.

Macros use a BASIC-like programming language that you'll have to learn if you want to record a macro that pauses for input at a dialog box; only WordPerfect now offers this capability. Ami Pro's mail-merge uses a convenient cardfile metaphor for organizing merge data, but on the whole, it is more difficult to program than the mail-merge features in WordPerfect and Word for Windows.

Ami Pro is the most frame-based of all word processors: Frames are so deeply integrated into the program that you can even include multicolumn text in a frame or create a text or picture frame that runs a macro when you click on it. Ami Pro supports OLE 1.0 but also has its own full-fledged drawing and charting functions built in. These graphics modules work together, so that any chart that you either

create by selecting data from one of Ami Pro's built-in tables or import via the Windows Clipboard becomes an Ami Pro drawing object you can manipulate with the built-in drawing tools. The built-in graphics-based equation editor is rich in options and is comparable with the equa-



Graphics tools in Ami Pro for Windows include standard table and charting tools, as well as the most advanced image enhancements around.

tion editor in Word for Windows; both are vastly superior to WordPerfect's archaic code-based equation editor.

FILE MISMANAGEMENT

Neither WordPerfect nor Word for Windows can import files created by the other, but Ami Pro can import files created by either. But all other aspects of Ami

and open the file.

The inept Master Document feature lets you enter text in a master document without warning you that the text will never print; only the files you list in a special master document menu are included when you print the master document. But the outlining feature is elegant and efficient and lets you clarify the structure of a document by using one set of fonts to distinguish between levels in outline mode and another set for ordinary text editing and printing.

ONE PAGE AT A TIME

Ami Pro's editing screen is well organized and responsive, with pop-up lists of styles, fonts, and point sizes on the status line. It's not, however, as flexible and customizable as WordPerfect's or Word for Windows'. If you edit in the full-WYSIWYG layout view, for example, the dis-

play jumps disconcertingly from the foot of one page to the top of the next, but it won't display portions of both pages at the same time—except in an uneditable facing-page preview. The draft view displays text formatting and tables, but not frames and images. Bubble help, newly added in Version 3.1, pops up over some but not all of the toolbars.

The keyboard layout employs function keys to assign styles and lacks the enormous range of keyboard controls available in WordPerfect and Word for Windows. There's no keystroke that switches on a select or "block" mode, so you can extend a selection only with the arrow keys or mouse, and you can't use menu items such as Find or GoTo. As in WordPerfect, bookmarks can't overlap, but at least Ami Pro displays an error message when you try to create one bookmark over another; WordPerfect silently wipes out the earlier bookmark.

Paragraph formatting is controlled from the all-in-one style dialog, which pops up when you click the right mouse button over text. The program, however, doesn't have the full range of typographic options available in newer packages. Although you can control indents and spacing from the text menu, some paragraph-formatting options can be set only through

The latest version of Ami Pro for Windows gets all of the basic and most of the advanced word processing jobs done quickly and intuitively.

Pro's file management are weak. The File Open dialog includes a preview window that (like the one in Word for Windows) displays files only in graphics mode, which means that most files display slowly. There are no facilities for finding files, and though you can copy and delete files from a separate file manager window, you can't click on a filename in that window

the style dialog, and if you forget to create a new named style when changing options to a single paragraph, you may be surprised to find the same options applied to paragraphs elsewhere in your document. When you right-click on a frame, a convenient frame layout dialog pops up, with options similar to those in the style dialog.

Lotus promises an updated version of Ami Pro but won't give any details. Meanwhile, the latest version can't provide all the dazzling automation of its peers. But it does get all of the basic and most of the advanced word processing jobs done quickly and intuitively, and its workgroup features are the best around.

Microsoft Corp.



EDITORS' CHOICE

Microsoft Word for Windows 6.0a

Microsoft Word for Windows, Version 6.0a, doesn't do everything, but almost all the features it includes are implemented with more power, logic, and elegance than you'll find in any of its rivals. Word for Windows is the word processor that most efficiently automates both writing and formatting. It can't match WordPerfect for Windows in file management or publishing features, and it lacks the full Lotus Notes-based network automation of Ami Pro for Windows, but its overall balance of raw power and precise detail is unmatched anywhere else.

Word for Windows' automation options include Wizards that build faxes, calendars, letters, and reports according to your specifications. Other automation features convert raw copy into headlines and format text according to the stylesheet of your choice. These conversions aren't perfect, and they only work if you use Word for Windows' built-in style names, but no other word processor offers anything like it.

THE NEW AUTO-CULTURE

Word for Windows' auto-correct option transparently expands preset abbreviations and corrects common spelling errors as soon as you finish typing a misspelled

word. You can even set auto-correct to replace an abbreviation with a graphic or table. Word for Windows will also replace typewriter-style quotation marks with typographic quotes on the fly.

Its auto-format feature for tables lets you choose table styles from a gallery of samples, and then automatically adjusts the table's size and formatting to match your choice. Mail-merge in Word for Windows is blissfully simple, providing an option to preview merge output before performing the merge.

FORMAT FLEXIBILITY

Word for Windows' simplicity and intuitiveness are especially impressive when you consider the program's almost limitless range of formatting and editing features. Most actions can be performed through icons or keyboard shortcuts; you can, for example, slide a paragraph up or down a file with a keystroke. Despite a clumsy implementation, the 100-level Undo feature is unmatched by the Undo feature found in other Windows word processors. Word for Windows' styles offer subtle control over formatting of paragraphs or characters, but you have to resort to awkward work-

references to a numbered item. A powerful bookmark feature can be used to display anywhere in your text the contents of a cell in a table elsewhere in the file. It can also be used for indexing and hypertext functions.

Word for Windows' OLE 2.0 support lets you use an intuitive graphical editor for creating equations directly on the page. Other OLE-enabled applets supplied with Word for Windows let you create drawings, graphs, and decorated or distorted text, and a new applet adds scanner support and bitmapped image enhancement. You can add call-outs and annotations to tables and graphics with the built-in drawing tools. A dialog box makes it easy to add characters from any font, and the Compose feature lets you type accented and other foreign characters from the keyboard (although not as intuitively or extensively as WordPerfect's equivalent).

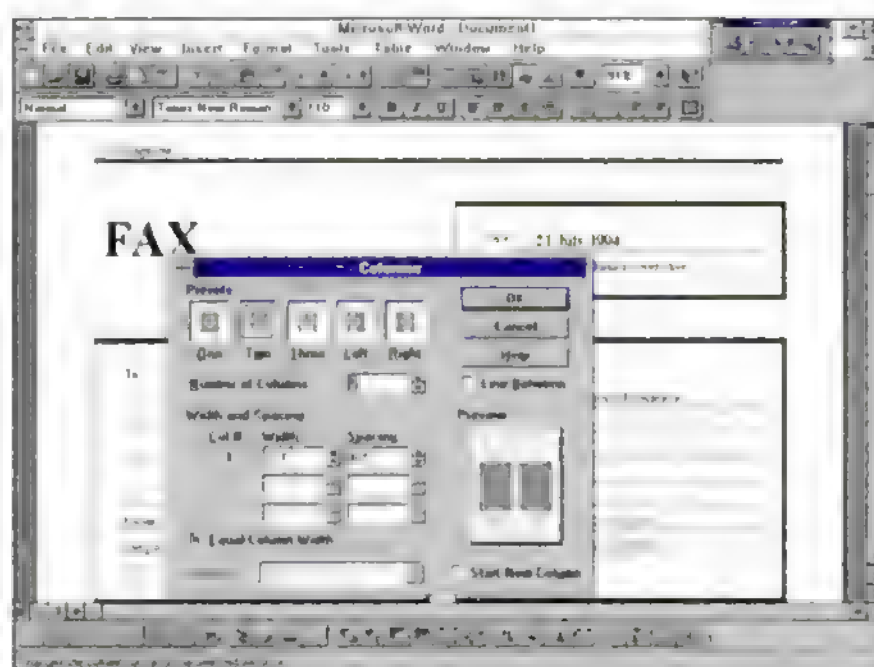
Macro writers must learn the WordBasic language, which is more powerful than WordPerfect's macro language but harder for nonprogrammers to master. Unlike WordPerfect, Word for Windows doesn't let you record a macro that pauses for input at a dialog box; you have to write a programmed macro to perform that simple feat.

DIVERGENT VIEWS

Word for Windows' editing screen lets you work at almost any level of magnification and detail, from a page view (which can show multiple pages) to a normal view (which shows most formatting, except headers and footnotes) to a combined outline and master-document view (which lets you manage large files efficiently).

Word for Windows' numerous viewing options include a unique pane that displays footnotes and annotations when the corresponding text appears in the main window. Word for Windows is the only major Windows word processor that lets you simultaneously edit different sections of the same file in different windows.

You can choose to display the field codes that represent variables (such as the current date or the total number of pages in a file), or you can display the variable itself as it will appear on the page. Like WordPerfect and Ami Pro, Word for Windows lets you edit from a completely clean screen, with an optional panic button that brings back your preferred choices among Word for Win-



One of Word for Windows' Wizards created the fax in the background. The column dialog box is typical of the package's clear choices and convenient preview images.

arounds to rename custom styles so they use the built-in style names.

You can customize the default bullet and numbering formats, but only the original defaults appear on the menus. You can overcome this problem—albeit awkwardly—with styles, but Word for Windows' numbering scheme is generally inconvenient, and any modifications you make to a numbering format won't appear in cross-

We're Becoming Very Big In Monitors.



Imagine this: Once every 15 seconds someone in the USA buys a new CTX color monitor.

That's a million last year alone – more even than sold under big names like NEC, Sony, IBM and Mitsubishi*.

And that's before the international experts started raving about our bigger, new, high-performance 1765GM and 1785GM 17-inch "green" monitors:

"Best 17-in. monitor" (Monthly PC Magazine, Japan).
"Best overall performance" (Soft & Micro Magazine, France).
"Symbol of Excellence Award" (CETDC/ Business Week Asia, Taiwan).
"Best Display Products" (CompuTex/Byte, Taiwan).

Not only does the larger, flat-square tube give you more display area for Windows®, an ultra-fine .26mm dot

pitch and flicker-free 1280 x 1024 at 75Hz resolution bring your graphics and CAD apps to life as never before.

Users thrive on the ergonomic design; anti-glare, anti-reflection, anti-static screens; and full-featured digital touch-panel that lets you control everything right from the front.

These new low-radiation (MPR II-compliant) "green" monitors use only five watts of power when "on" but inactive. That's six times better than even the US EPA's own Energy Star guidelines.

So how did we get so big so fast? Simply by giving you more for less. For more information, call your nearest CTX office.

CTX

CHOICE OF THE PROS

USA Headquarters 20530 Earlgate Street, Walnut, CA 91789, 909-595-6146, Fax 909-595-6293 **Technical Support** 1-800-888-2012 **BBS** 909-594-8973 **Southern Region** 6624 Jimmy Carter Blvd., Norcross, GA 30071, 404-729-8909, Fax 404-729-8805 **Eastern Region** 481-A Edward Ross Drive, Elmwood Park, NJ 07407, 201-646-0707, Fax 201-646-1998 **Midwestern Region** 500 Park Blvd., Ste. 295C, Itasca, IL 60143, 708-285-0202, Fax 708-285-0212 **Southwestern Region** 1225 E. Crosby Rd., Ste. A21, Carrollton, TX 75006, 214-416-9610, Fax 214-416-7447



© 1994 CTX International, Inc. All brand names are trademarks or registered trademarks of their respective owners.
*Official 1993 Monitrak U.S. monitor sales research

CIRCLE 329 ON READER SERVICE CARD

See Us at Comdex Fall Booth S 2524



The
difference
between
rehearsal
and
performance
is
experience.

Why IBM for Client/Server.

Client/server computing is great for your people because it gives them easier access to more information. It's great for your business because it removes barriers between existing systems, giving you new flexibility to improvise, to reorganize, to reengineer.

So your question isn't whether to explore client/server, it's what to look for in the people who help you, and here's a suggestion. If they don't have a long list of references in multiplatform, multivendor integration and if they don't have solid knowledge of your kind of business, call someone who has. Someone like IBM.

We have more experience with more kinds of platforms, networks and industry applications than anyone. So when we custom-tailor your solution, we can be more objective about your options than single-platform vendors and more aware of your needs than third-party consultants.

Also, we keep careful track of everything we learn. Each client/server solution is unique, but we'll compare your situation with ones we've faced before to give you the direct benefit of real-world experience. What's more, we can help you at any stage—from initial consulting to implementation—and we now have 40 IBM Open System Centers worldwide for testing multivendor solutions before installation.

Nobody wants to be a vendor's rehearsal, and with us you won't be. We've built hundreds of successful client/server solutions, and we're eager to help you with yours.

*For a quick response, ask
for extension "star" 802 at* 1800 IBM-3333.



dows' menus and other screen equipment.

Some of Word for Windows' viewing options are less intuitive than they should be. You can't set options for the normal View while using the page View, and the options for each view aren't listed on the menu until you switch to that view. You can see the footnote separator line in the page view, but if you want to modify it, you have to switch to the normal view, where you can't see the separator until you open a footnote pane and choose the separator from a drop-down list.

MANAGEMENT HELP WANTED

Word for Windows' clear help system is one of its most notable strengths. The program's most glaring weakness is its file management—an area in which WordPerfect is notably strong. Word for Windows uses only one default document directory, and it lacks the descriptively named file specifications available in WordPerfect. Word for Windows includes advanced options for file searches, but simple navigation of your disk or network is overly frustrating.

Word for Windows, like WordPerfect, is larger and slower than it should be, with notable delays before some drop-down menus appear. But at least until overhauled Windows versions of WordPerfect and Ami Pro arrive, Word for Windows will remain the one word processor that does more than any other to simplify and automate the tasks of creating and formatting text. Despite minor flaws, it ranks among the greatest programs ever written.

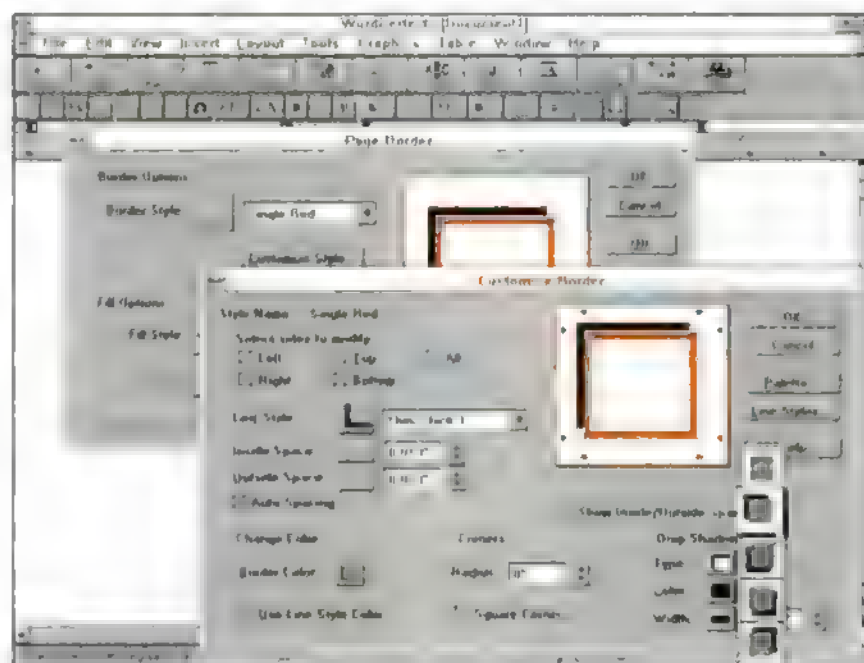
WordPerfect, The Novell Applications Group

• WordPerfect 6.0a for Windows

WordPerfect 6.0a for Windows ranks as the most muscular of all word processors, with powers to format text, organize page layouts, and manage data that no other program can match. Users of WordPerfect's flagship product may never need another application, because the program includes a built-in spreadsheet with more than 100 functions, a customizable file manager and text indexer, as well as add-on drawing and charting modules. WordPerfect for Windows often seems muscle-bound, with some overloaded menus and awkward procedures, but it never seems

at all underpowered.

WordPerfect is the only application that seems to understand that you want to keep track of your data after you have created it. Every dialog box that lets you open a file also doubles as a file manager, complete with the abilities to delete or rename files, create directories, and print a selected list of files in a directory or tree. You can give descriptive names to directories



Graphics options in WordPerfect for Windows include the most extensive and customizable set of borders, fills, and patterns available outside advanced illustration programs.

or file specifications, so a single mouse click can bring you to any file or list of files you need, obviating the tedious navigation other programs require. The viewer displays files quickly in ASCII format, but it's smart enough to display graphical formats when you view a graphics-only file.

EUREKA!

The same dialogs you use to select files also have buttons that lead directly to an advanced file indexer and text finder. Once this program has indexed your files, you can use Boolean and other complex operators to find any data in seconds; a scheduler lets you update the index automatically. If you choose not to index your files, you can use the same search criteria to scan files on-disk, and you can save and reuse these searches.

WordPerfect's other main strength is its formatting, which includes an enormous range of borders, backgrounds, and transparent "watermarks," as well as a subdivide-page feature that's ideal for leaflets, tickets, and folders. The program's advanced typographic controls sport fine-tuning normally available only in high-end typesetting systems, and the

program comes with built-in support for virtually any language that uses alphabetic characters.

MIDDLEWEIGHT AUTOMATION

WordPerfect's automation features include a less-powerful version of the on-the-fly correction feature found in Microsoft Word for Windows, Version 6.0a. (Unlike Word for Windows, WordPerfect

won't automatically replace abbreviations with graphics.) The Smart Quotes feature that converts straight quotation marks to typographic quotes is less well integrated into the program than it is in Word for Windows, but it gets the job done. Automated templates let you use a built-in address book to address faxes or memos. Tables include all the advanced functions of the old PlanPerfect spreadsheet package. You can record a macro that stops at any dialog box for input—a feat that requires programming in Word for Windows and Ami Pro for

Windows. Macro programmers can use a toolbar that inserts commands with the correct syntax and parameters directly into a macro file.

WordPerfect's customization options are richer than those found in any other application. You can install other applications on its toolbars, and you can decide which fonts and sizes appear when you choose a toolbar font list. You have almost total control over what appears on the status bar, and you can switch easily between customized keyboard layouts. But you can't modify the menus that pop up when you click the right mouse button.

The editing screen switches between draft view (which shows almost everything except headers and footnotes), full-page view, and double-page view. Each view lets you hide all menus and toolbars. Unless you edit or create styles, you may never need to look at WordPerfect's traditional Reveal Codes window, because the program is smart enough to place format codes where they logically belong.

DISJOINTED INTERFACE

WordPerfect still lacks on-the-fly redlining, and although Version 6.0a improves



everything IS NEW
nothing IS THE WAY it
WAS.

it's the wake-UP CALL
for a NEW way
of WORKING.
TIME TO rise and shine.

INTRODUCING 1-2-3 RELEASE 5. NOW THE LEGENDARY SPREADSHEET BRINGS MORE PEOPLE TO THE NUMBERS AND THE NUMBERS TO LIFE.

1-2-3® has always helped individuals become more productive. Now it goes to a new realm—workgroup productivity. With strengthened ties to Lotus Notes® and new, sophisticated routing features, workgroups are using 1-2-3 Release 5 to make decisions, reach consensus and explore possibilities.

No other spreadsheet has the features of 1-2-3 Release 5. Features that make everyday spreadsheet tasks easier. Features that help you move from task to task fluidly. Maximum productivity, minimum effort.

freedom
of MOVEMENT,
NOT
chains of COMMAND.

TAP THE POWER OF NOTES WHEN
YOU'RE IN 1-2-3. TAP THE POWER OF
1-2-3 WHEN YOU'RE IN NOTES.

Say you're working on the annual budget in 1-2-3. You can save your spreadsheet in Notes. Then share ideas and information with colleagues working on the same budget at the same time.

Any changes to your spreadsheet are automatically synchronized and distributed thanks to Notes replication technology. Plus Notes' security protects the integrity of your data.



When you're working in Notes and want to crunch

numbers, prepare budgets or perform "what-if" analyses, you can launch into 1-2-3 with Notes/FX™ 1.1—to get the power of 1-2-3 right in your Notes application.

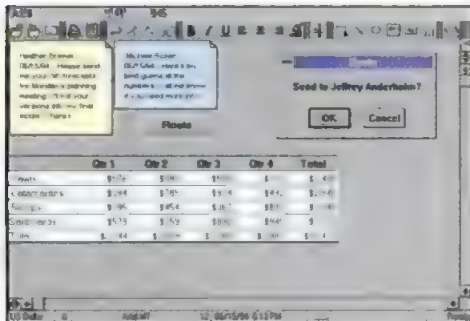
Notes/FX goes beyond OLE to provide you with a dynamic two-way exchange of key information



between Notes and 1-2-3. So you can roll that 1-2-3 information back into any Notes application.

POWERFUL WORKGROUP FEATURES EVEN WITHOUT NOTES.

1-2-3's powerful Version Manager™ lets each person in your workgroup save multiple sets of charts to any name range. So you know the who, what, when and why of every change all the time.



1-2-3's Range Routing lets you share data with colleagues—sequentially or all at once—collecting their comments and input into a single document.

Plus, unlike other spreadsheets, 1-2-3 can designate particular ranges for comment or review by particular users, rather than routing the entire worksheet. Range Routing lets you mail the spreadsheet range to workgroup members for input, track progress, then roll everyone's ideas back into your file, complete with comments and changes tracked as versions.

1-2-3 Release 5 worksheets and ranges can be routed using either VIM or MAPI based e-mail and can be routed either serially or in parallel.

MAXIMUM PRODUCTIVITY, MINIMUM EFFORT.

1-2-3 Release 5 is packed with innovative new features designed to help you get more done with less effort.

SmartMasters™ are predesigned and customizable templates of everyday business forms—like expense reports, invoices and purchase orders—with built-in intelligence to guide you through common tasks

in record time. Or create custom SmartMasters for yourself or your workgroup.

With Lotus Maps you can create instant maps of geographic data. Select a range of data and watch 1-2-3 Release 5 create the appropriate map with color-coding based on data ranges. 1-2-3 Release 5 ships with maps for the world by country, U.S. by state, Canada by province, Europe, Mexico, Japan, Taiwan and Australia.

1-2-3 Release 5 features seamless integration with Lotus Approach® database to easily create data entry forms and generate reports and mailing labels.

With Fast Format you can apply the formatting you've designed for one range to any other range in the worksheet—with one click of the mouse.

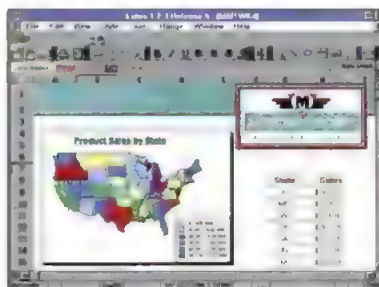
One-Step Charting lets you build a chart complete with labels, titles and legends, all in a single step.

Drag-and-Fill fills in ranges from other documents in just one step. And our improved OLE 2.0 Drag-and-Drop lets you move copy or data across worksheets or files fast.

Multi-page Print Preview lets you view up to nine spreadsheets on your screen before you print.

Taken all together, the new 1-2-3 is loaded with enhancements that make getting the job done a whole lot easier—alone or in a workgroup. And 1-2-3 Release 5 gives you the best compatibility with 1-2-3 for DOS of any spreadsheet. To learn more about 1-2-3 Release 5, visit your Lotus

Authorized Reseller or call **1-800-TRADE-UP, ext. A135*** for a free demo disk. A 1-2-3 upgrade costs \$119.**



1-2-3 Release 5 features Lotus Maps. It's the easiest, most effective way to analyze your spreadsheet data geographically.

Lotus
Working Together

NEW SMARTSUITE 3.0. A MAJOR RELEASE TO HELP YOU AND YOUR TEAM WORK TOGETHER.

To work better people need powerful desktop applications, built for both individual and team productivity. SmartSuite® 3.0 is exactly that. It's the best suite for this new way of working because it's the only suite built to optimize Lotus Notes.

The applications that make up SmartSuite have been upgraded in some very important ways—so they work harder and work together better than ever.

1-2-3 Release 5 is packed with new features like SmartMasters spreadsheets templates, Lotus Maps for geographic visuals of data, Smart Assistants to guide you, seamless integration with Approach database, Range Routing for

drawing tools. Ami Pro also seamlessly imports documents from other word processors.

Freelance Graphics® 2.1 features task and industry

specific SmartMasters, a unique 3-step process to create presentations, charting and drawing, presentation management and improved import/export capabilities.

And Organizer™ 1.1 offers easy linking for cross-referencing, flexible printing, group scheduling and nifty integration with Ami Pro so you can create monthly calendars in Ami Pro from Organizer appointments.

SMARTSUITE 3.0 IS A BETTER INTEGRATED SUITE ACROSS THE BOARD.

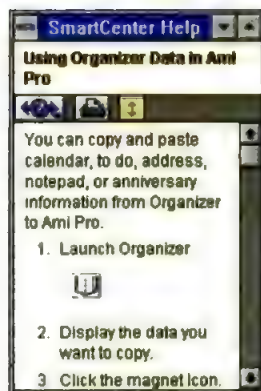
The integration in SmartSuite begins with a consistent look and feel across applications—they share a common user interface, menus, SmartIcons® and a Live Status Bar.

SmartCenter, the headquarters for cross-application services, is always there to help you switch or launch applications. You can customize its icon palette into the configuration that's most convenient for you.

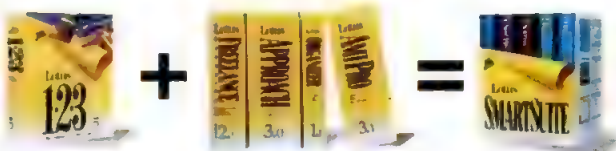
SuiteAnswers are cross-application help tools which include a SmartSuite Guided Tour and task-oriented Help Cards—plus the new ScreenCam™ for creating audio/visual "screen movies." It's the only help service in Windows™ that stays up as you move between applications.

Smart Assistants are your step-by-step guide through common tasks.

And our powerful 1-2-3/Approach database integration lets you analyze and format 1-2-3 data, taking full advantage of Approach's easy-to-use



Help Card, one of SmartSuite's powerful help tools, guides you through cross-application tasks.



mailing spreadsheet ranges, OLE 2.0 Drag and Drop, and, of course, Lotus Notes Integration.

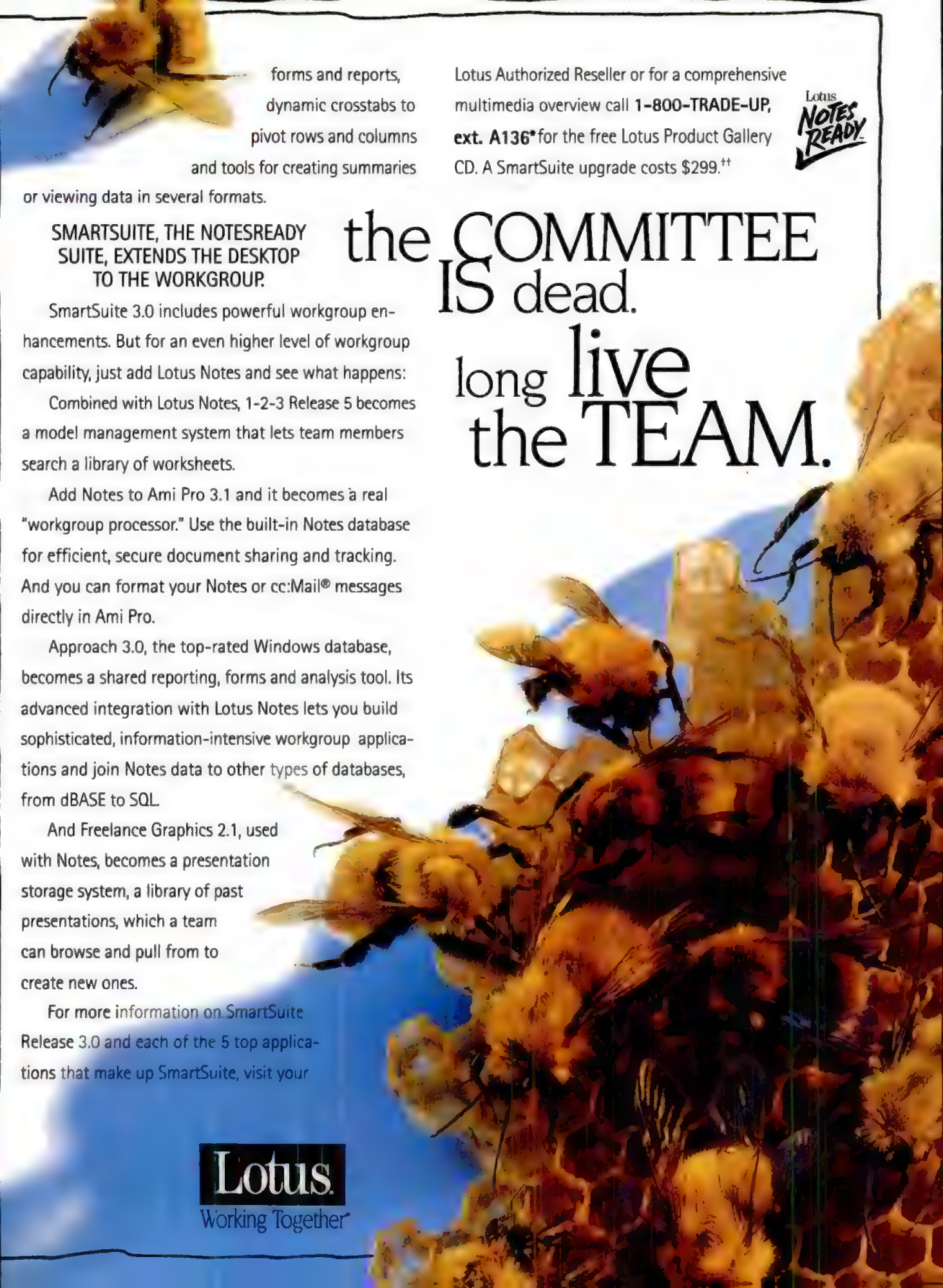
The new Lotus Approach 3.0 offers unprecedented ease-of-use, PowerClick™ reporting, X10™ technology (our new, exclusive, speed-optimized architecture) and the easiest-to-design forms, mailing labels and cross-tabs on the market.

Ami Pro® 3.1 offers powerfully fast word processing (49% faster than Word, 103% faster than WordPerfect®), low memory/hard disk requirements (4MB RAM, 15MB for complete installation), with proofing tools, collapsible click and drag outlining, revision marking, powerful macro language and automatic list renumbering. There are over 55 predesigned style sheets for memos, faxes, reports and more. Built-in charting & in-context



SmartCenter is always there to help you launch applications or switch between them. And Bubble Help is right there for you—all you do is point.

SuiteAnswers menu



forms and reports,
dynamic crosstabs to
pivot rows and columns
and tools for creating summaries

or viewing data in several formats.

**SMARTSUITE, THE NOTESREADY
SUITE, EXTENDS THE DESKTOP
TO THE WORKGROUP.**

SmartSuite 3.0 includes powerful workgroup enhancements. But for an even higher level of workgroup capability, just add Lotus Notes and see what happens:

Combined with Lotus Notes, 1-2-3 Release 5 becomes a model management system that lets team members search a library of worksheets.

Add Notes to Ami Pro 3.1 and it becomes a real "workgroup processor." Use the built-in Notes database for efficient, secure document sharing and tracking. And you can format your Notes or cc:Mail® messages directly in Ami Pro.

Approach 3.0, the top-rated Windows database, becomes a shared reporting, forms and analysis tool. Its advanced integration with Lotus Notes lets you build sophisticated, information-intensive workgroup applications and join Notes data to other types of databases, from dBASE to SQL.

And Freelance Graphics 2.1, used with Notes, becomes a presentation storage system, a library of past presentations, which a team can browse and pull from to create new ones.

For more information on SmartSuite Release 3.0 and each of the 5 top applications that make up SmartSuite, visit your

Lotus Authorized Reseller or for a comprehensive multimedia overview call **1-800-TRADE-UP, ext. A136*** for the free Lotus Product Gallery CD. A SmartSuite upgrade costs \$299.**



the COMMITTEE
IS dead.
long live
the TEAM.

Lotus
Working Together™

SMARTSUITE 3.0

SmartCenter
(to move between applications)

SmartMasters
(for predesigned templates)

Fast Format
(apply styles throughout documents)

ScreenCam
(to put your ideas in motion)

Smart Assistants
(to guide you)

Configurable Single Install
(for easy one-step installation)

Small Footprint On Your PC
(the most efficient suite available)

1-2-3/Approach Integration
(database power in your spreadsheet)



1-2-3 RELEASE 5 SPREADSHEET



SmartMasters
(useful predesigned templates)

Lotus Maps
(geographic visuals of data)

Lotus Approach Integration
(for extra database power)

Smart Assistants
(to guide you)

Range Routing
(for mailing spreadsheet ranges)

Direct Access To
Database Files
(open dBASE and Paradox®
files directly into 1-2-3)

OLE 2.0 Drag-And-Drop
(move or copy data, with
visual mouse cues)

APPROACH 3.0 DATABASE



PowerClick Reportwriter
(for wysiwyg design)

Smart Assistants
(to guide you)

InfoBox
(instant on-screen
manipulation)

X10 Speed Architecture
(for blazing speed)

Lotus 1-2-3 Integration
(for working with 1-2-3)

PowerKey™ Technology
(for direct access to
existing data)

Dynamic Crosstabs
(for drag-and-drop
analysis)

AMI PRO 3.1 WORD PROCESSOR



New Proofing Tools
(for easy document proofing)

Collapsible Click-And-
Drag Outlining
(simplifies organization)

Revision Marking
(edit documents without
confusion)

New Style Sheets
(more professionally
designed templates than ever)

Text Styling
(make your e-mail
look better)

WordPerfect Switchkit®
(the move from DOS
is painless)

Stick-It Notes
(add comments and
messages)

FREELANCE GRAPHICS 2.1 PRESENTATION GRAPHICS



Unique Three-Step Process
(for quick and easy
presentations)

One-Click Charting
(access a library of charts and
drawings with one click)

Page Sorter
(presentation management
at a glance— review and
rearrange with ease)

Import/Export
(more file formats than
ever— including
Harvard/DOS and
PowerPoint® 3.0)

ORGANIZER 1.1 PERSONAL INFORMATION MANAGER



Easy Linking
(makes cross-referencing
simple)

Flexible Printing
(for your manual planner,
mailing labels from your
address book)

Group Scheduling
(use with cc:Mail to set up
meetings with anyone on
your WAN or LAN)

Real Time Access
(instantly view co-workers'
busy and free time)

how the NEW SMARTSUITE 3.0 HELPS workgroups work.

The new SmartSuite 3.0. Featuring major new releases of 1-2-3, Ami Pro, Approach database and Freelance Graphics—plus the popular and powerful personal information manager Organizer—this is the ultimate integration of your most important desktop tools. For more information on SmartSuite Release 3.0 and each of the 5 top applications that make up SmartSuite, visit your Lotus Authorized Reseller or for a comprehensive multimedia overview call 1-800-TRADE-UP, ext. A136* for the free Lotus Product Gallery CD. A SmartSuite upgrade costs \$299.**



*In Canada call 1-800-GO-LOTUS. **\$119 suggested retail upgrade price. *NSTL, May 1994. **\$299 promotional price available while supplies last. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. Lotus, Lotus Notes, 1-2-3, Approach, Ami Pro, cc:Mail, Freelance Graphics, SmartSuite, SmartIcons and Working Together are registered trademarks and ScreenCam, PowerClick, Notes/FX, Version Manager, SmartMasters, Organizer, PowerKey, X10 and NotesReady are trademarks of Lotus Development Corporation. WordPerfect and Switchkit are registered trademarks of WordPerfect Corporation. PowerPoint is a registered trademark and Windows is a trademark of Microsoft Corporation. Paradox is a registered trademark of Borland International, Inc.

Performance Tests: Word Processors

No, you're not imagining things; your word processor may have gotten slower. Both of the packages significantly revised since our last word processing roundup—Microsoft Word for Windows and WordPerfect for Windows—ran more slowly than their predecessors on our tests. Ami Pro for Windows, a good performer in our last roundup, remains competitive.

What the Numbers Mean

Microsoft has added a print spooler to Word for Windows 6.0a, so the package now returns keyboard control far faster than either of its competitors. Word for Windows continues to perform well—although not at the top of the class—in total printing time. Our tests demonstrated that it is far and away the fastest of the three packages when it comes to spell-checking, however. Finally, it shared first-place honors with Ami Pro for Windows on our Compound-Document Load and Search-and-Replace tests.

The release of WordPerfect for Windows, Version 6.0, was greeted by a virtual storm of speed-loss reports from users of the product. The current version, 6.0a, while faster than Version 5.2, and in this round of testing failed to nudge out the competition in any of our testing categories. On the other hand, while WordPerfect's scores were indeed the slowest, its times were not hugely slower than those posted by the other products.

Ami Pro for Windows, Version 3.1, managed to retain its former ranking as the fastest product in overall printing speed, and it finished second to Word for Windows in promptness of returning keyboard control to the user. Again, Ami Pro shared with Word for Windows first-place honors on the Compound-Document Load and Search-and-Replace tests.

How We Tested

We performed all tests on a Compaq Deskpro 486/33M equipped with a 340MB hard disk and 8MB of RAM running DOS 6.2 and Microsoft Windows 3.1. Output was sent to an HP LaserJet III with 1MB of RAM.

To set up for the text portion of our loading, scrolling, and printing tests, we imported a 100,000-byte ASCII text file into each application. We formatted the text in a 12-point serif font and set the appropriate margins to ensure that it paginated identically in each program. Finally, we saved the document in each program's native format. We also set up a compound test document that contained a 750K TIFF file and a 16K .PCX file surrounded by text formatted with multiple fonts and type sizes.

TEST CATEGORIES

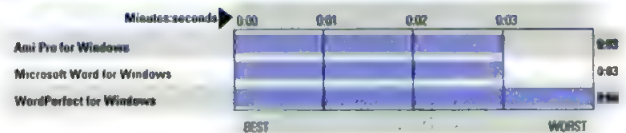
The **Compound-Document Load** test measures the time it takes a word processor to open our compound-document file from disk.

For our **Search-and-Replace** test, each package searches the document for 103 instances of the word *gun* and replaces each one with *run*.

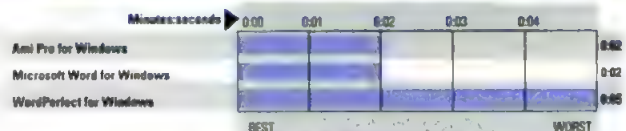
For our **Spell-Check** test, we seed our test document with ten misspelled words and run an initial spell-checking pass to add to the supplemental dictionary any correctly spelled words not included in the dictionary. We then restart the computer and spell-check the file. Timings are cumulative, beginning when we press Enter to start the spell-check and ending when the spell-checker reaches the end of the document, but pausing each time the checker finds a misspelled word (thus excluding the time taken to make corrections).

For our **Compound-Document Print** test, we use the compound document described above, timing printing from the moment we press Enter to start the print job to the moment that the second page finishes printing. We also note how long it takes before control is returned.

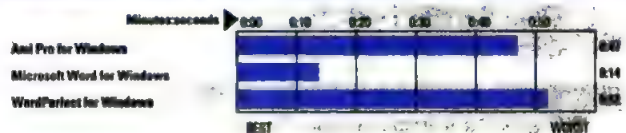
COMPOUND-DOCUMENT LOAD



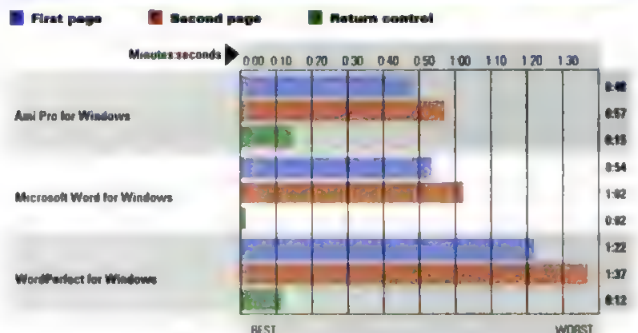
SEARCH-AND-REPLACE



SPELL-CHECK



COMPOUND-DOCUMENT PRINT



Step into the Future with Everex STEPTM Note



Built-In Upgradability

Four steps to the perfect portable:

- Step 1 - upgrade the CPU from 486SX-33 through IDK2-50 to Intel DX4-75
- Step 2 - upgrade the display from mono STN through color DSTN to TFT
- Step 3 - upgrade the removable hard disk from 120MB through 250MB and 340MB to 514MB
- Step 4 - expand your options with fax/modem, Ethernet, SCSI and other PCMCIA cards

Road Ready Multimedia

Integrated digital audio chip set and sound generator lets you record, compress and play back. The Everex STEP Note includes built-in speaker and microphone, plus a jack for external ones.

Reliability & Service

The Everex STEP Note carries on the Everex tradition of reliability. We also include a 2 year warranty for additional peace of mind.

486SX mono starts at \$1,495.

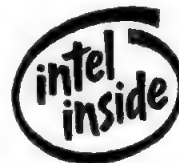
486SX color starts at \$1,995.

Intel DX4-75 TFT starts at \$3,495.

CIRCLE 090 ON READER SERVICE CARD

Call **1-800-EVEREX4** (1-800-383-7394) for the location of the dealer nearest you.

5020 Brandin Court
Fremont, California 94538
Fax (510) 683-2186



The Intel Inside logo is a registered trademark of Intel Corporation. All other trademarks used herein are the property of their respective owners.

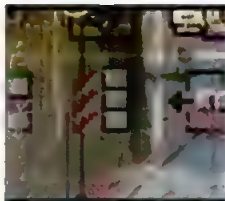
on the speed of Version 6.0, it remains slower than Ami Pro in many operations. The program's major flaw, however, is the disorganization and inconsistency of much of its interface. Parts of the program that should be integrated smoothly sometimes aren't connected at all. The envelope-formatting window, for example, includes a list of mailing addresses, but it's entirely separate from the list of addresses used for automated templates, and you have to create both lists separately. Although styles are uniquely flexible and can include formatted text, the style editor uses a baffling menu system and a reveal-codes screen.

STRENGTH IN NUMBERS

WordPerfect's paragraph-numbering system is more powerful than any other, but it's buried confusingly in the Outline menu. If you want to include customized numbering in a style, you must first dig into the Outline menu to customize the numbering, and then descend into the Style menu to use it. Word for Windows lets you accomplish all this from a single intuitive dialog box.

Some features in the Windows version of WordPerfect are harder to use than the equivalent features in the DOS version. For example, the Floating Cell feature, which lets you insert in your text the data from a table cell (or use virtually any other table function directly in your text) is controlled from one menu in WordPerfect for DOS. But in WordPerfect for Windows, you must create a floating cell with one menu and then go to another menu and open a toolbar before you can manipulate the cell in any manner. Moreover, you can only learn this from third-party books about WordPerfect; the manual tells you merely that the feature is available, without explaining how to use it.

Version 6.1, due around the time you read this, will include minor interface improvements, OLE 2.0 support to replace the 1.0 support in Version 6.0a, and impressively tight integration with other PerfectOffice 3.0 for Windows applications. Meanwhile, even if Version 6.0a isn't exactly the most elegant application on the market, it remains the most powerful.



Spreadsheets

INTRODUCTION AND REVIEWS BY CRAIG STINSON

This year's spreadsheet software action rumbles along two fronts called *ease of use* and *power*. Breaking down usability barriers is still the most crucial task confronting development teams for Lotus 1-2-3, Microsoft Excel, and Quattro Pro. Hence these products' exploding populations of Smart Assistants, Experts, Wizards, coaches, tutors, and other friendly agents.

The most noteworthy simplifications this year have taken place in the area of database management. Until the arrival of 1-2-3 for Windows 4.0 and Excel 5.0, extracting particular records from a worksheet database was a task only for advanced users. Now with 1-2-3's Data Query Assistant and Excel's Autofilter command, anyone can do it. Excel also offers intelligent sorting and a transparent-

ly simple subtotaling command for those who manage lists on the worksheet grid.

All three major spreadsheets have now tamed the terrifying Data Parse command. Wizards in Excel show you how text imported from external data files will be split across columns and let you fine-tune with the mouse. Quattro Pro and 1-2-3 parse without requiring interaction.

MUSCLE MATTERS

In the power department, the most widely applicable recent innovation has been the dynamic crosstab—a type of report that lets you summarize and view data from many different perspectives. Excel's PivotTable Wizard and Quattro Pro's Data Modeling Desktop both allow you to reslice the data presented in a table simply by transposing field headings. The 1-2-3 for Windows 4.01 or 5.0 user who

Spreadsheets:

• Microsoft Excel 5.0

If you simply studied a features-comparison table for the three spreadsheets in this roundup, you might have difficulty picking a winner. They are mature products that have been going at each other head-to-head for the better part of a decade.

They all have more functions than most users will ever know what to do with. They all do gorgeous worksheets and dramatic three-dimensional graphs.

But if in addition to counting features, you also look at the depth and intelligence with which features have been implemented, a clear Editors' Choice emerges. More than the competition, the developers of Microsoft Excel, Version 5.0, have succeeded at figuring out what spreadsheet users do all day—and how to lighten their burden. In addition, with its professional-quality programming environment and support for OLE

automation, Excel is unequivocally the most sophisticated application-development platform.

Quattro Pro 5.0 for Windows and Lotus 1-2-3 for Windows, Release 5.0, each have unique features that may tilt the scales for particular users. Quattro Pro's function library is in a league of its own. If your current spreadsheet cannot gracefully handle some financial, calendar, or engineering function, check out Quattro Pro. 1-2-3 has the best scenario manager and is the only spreadsheet that (without add-ins) can generate maps from your data.



has Lotus Approach 3.0 can perform similar feats. (Lotus Improv 2.1 also creates transposable tables—among other things. Lotus recently announced that it would incorporate Improv technology into future versions of 1-2-3.)

For those who care about their numbers' geographical coordinates, the latest release of 1-2-3 provides a new kind of analytic power. Give 1-2-3 a column of numbers next to a column of state or country abbreviations, and the program will draw you a map. Will the next versions of Quattro Pro and Excel leap over the mapping frog? Stay tuned.

Meanwhile, what was true last year is true once again: Spreadsheets are smarter than ever, bigger than ever, and easier than ever to use.

Lotus Development Corp.

● Lotus 1-2-3 for Windows 5.0

The greatest strength of Lotus 1-2-3 for Windows, Release 5.0, is its support for collaborative applications. Thanks to Version Manager, Lotus's scenario-management system, 1-2-3 is more adept than either of its principal competitors at tracking and organizing contributions to group-think projects such as budgets and sales forecasts. It's also a superb tool for solo workers who need to compare alternative inputs.

Release 5.0, shipped last August, added an important new element to Version Manager: The originator of a worksheet can now send a selected range to a group of coworkers via VIM or MAPI. Recipients can then add their own numbers and return the range with optional sticky-note comments, whereupon the originator can feed the returned items into Version Manager automatically. Alternatively, users can mail some or all of a worksheet file to a group of colleagues, either as a broadcast or sequentially. (Microsoft Excel's Routing feature is comparable, but Excel can't mail partial files.)

These elements of Lotus's "working together" strategy hold up well under scrutiny. So does 1-2-3's ability to send the data in selected ranges to a Lotus Notes database and receive selected Notes fields into the 1-2-3 spreadsheet. This Notes/FX feature has been bolstered by Release 5.0's new File

Doc Info command, which records a worksheet's author, creation date and time, latest-revision date and time, keywords, and other vital statistics, any of which you can automatically pass to Notes.

With Excel's latest update, however, 1-2-3 is no longer alone in supporting Notes/FX. And in other areas where the "working together" slogan seems to promise particular excellence, Lotus is still playing catch-up with Microsoft. Release 5.0 introduced OLE 2.0 drag-and-drop support, allowing users to move and copy cells across page and file boundaries via the mouse. But other important elements of OLE 2.0—in-place editing and cross-application scripting via OLE automation—remain unimplemented. Also still in vapor is LotusScript, the company's proposed cross-application macro language.

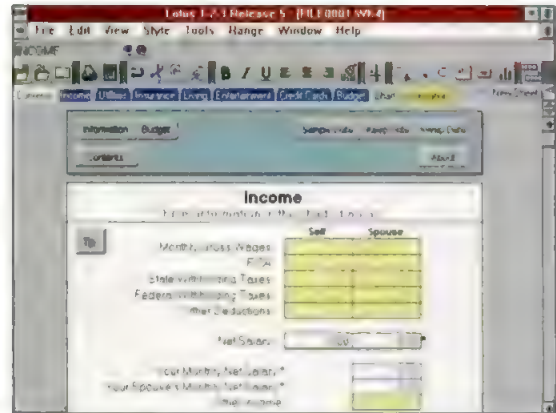
SMART APPROACH TO MAPPING

Lotus has added two important analytic tools and one great usability feature to its spreadsheet. The analytic tools are mapping and integration with the Lotus Approach for Windows 3.0 database. The usability goody is a superbly designed set of templates called SmartMasters.

With Release 5.0, 1-2-3 can analyze geographic data and show the results in a hatch-and-color-coded map. Start with a column of geographic identifiers (state abbreviations, for example) and some associated data. Select the data and choose New Map, and 1-2-3 performs a frequency analysis. In a moment, the map appears as an embedded graphical object. Double-clicking the map summons the map server applet, where you can see the map in full-screen display, make editing adjustments, and get coordinates for sites of interest, such as major customer locations.

With either Release 5.0 or Release 4.01, 1-2-3 users who also have an installed copy of Lotus Approach 3.0 can take advantage of some important new data-analysis tools. Approach adds four commands to the Database submenu: Form, Report, Dynamic Crosstab, and Mailing Labels. When you choose one of these, 1-2-3 launches Approach and feeds

it the selected worksheet range. When you return to 1-2-3, you see an embedded Approach icon that you can double-click to get back to the database program. Those who have struggled to write mailing-label or other reporting applications



Lotus 1-2-3 for Windows comes with a set of attractively designed SmartMaster templates to assist with commonplace spreadsheet applications.

in 1-2-3's macro language or coveted Excel's Pivot Table capability should love having these features accessible in 1-2-3.

Unfortunately, the integration with Approach is awkward. The OLE 1.0 hookup does not enable in-place editing, and long 1-2-3 text fields will overflow Approach's 256-character field limit. Unlike Excel's PivotTable Wizard, moreover, Approach's Crosstab Assistant does not group field items or perform internal calculations. To do these things, you'll need to preprocess in 1-2-3 or use other components of Approach.

ANALYTICAL PROWESS

Other features make 1-2-3 a particularly adept analyst of both on-sheet and external databases. For example, a visual querying system and some improvements to the database statistical functions effectively do away with the need for worksheet criteria ranges. This alone will lift many users over what used to be an insuperable usability barrier. Further, the program now parses delimited text files automatically and imports Paradox for Windows and dBASE files without requiring a separate translation step. On the other hand, 1-2-3 lacks Excel's handy subtotaling commands; for that, you will need Approach's report generator.

The SmartMasters—a set of highly us-

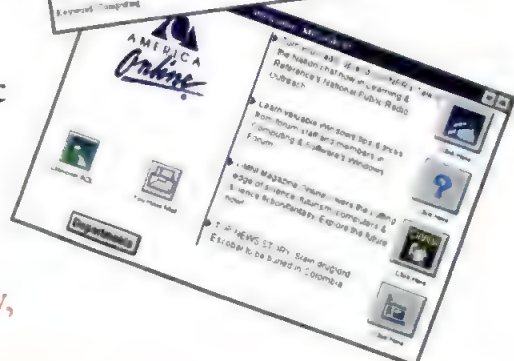
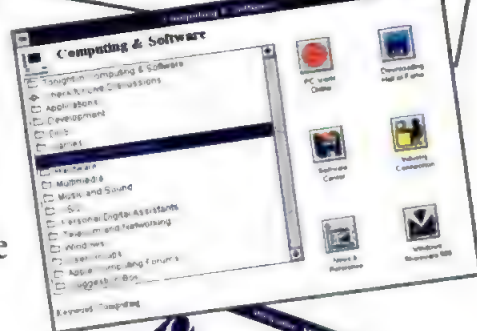
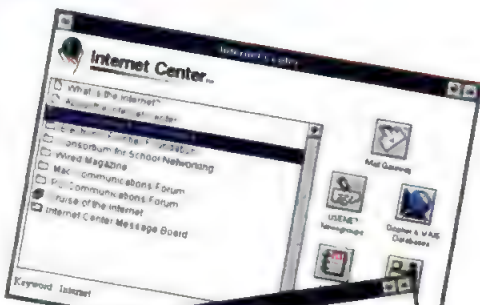
Own a Modem?

Try America Online FREE



If you own a computer and a modem, we invite you to try the nation's most exciting online service, America Online®, FREE.

- ▲ Build a personal software library by downloading from a library of over 50,000 files—productivity software, games, and more!
- ▲ Navigate the Internet with ease through the Internet Center.
- ▲ Get computing support from industry experts at online conferences and through easy-to-use message boards.
- ▲ Plus, unlimited e-mail, news updates, financial information, and live nationwide access to an electronic community.



We'll send you the software and give you 10 FREE hours to try America Online—risk-free.

Simply complete and mail the form below, or fax it to 1-800-827-4595.

**Detach &
Mail Today!**
Must respond by
11/15/94

Yes! I'd like to try America Online—FREE.

Send me the free software and trial membership. I understand there's no risk—if I'm not completely satisfied, I may cancel without further obligation.



NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

() _____
HOME PHONE

SELECT DISK TYPE AND SIZE —

Windows*: ☐ 3.5 ☐ 5.25 ☐ High Density ☐ Low Density

DOS: ☐ 3.5 ☐ 5.25 ☐ High Density ☐ Low Density

*To use America Online for Windows, you must have a 386 PC or higher, 4MB of RAM, a VGA monitor, a mouse, a modem, and a working copy of Windows 3.1
Use of America Online requires a major credit card or checking account. One free trial per household. America Online is a registered service mark of America Online, Inc. Other names are service marks or trademarks of their respective owners.



**ATTENTION
MODEM OWNERS!**

RESPOND BY 11/15/94!

How Many of These America Online Services Could You Use Right Now?

- ▲ Real estate advice
- ▲ Issues of your favorite magazines online
- ▲ The vast resources of the Internet
- ▲ Portfolio management, including stock quotes and Morningstar Mutual Funds service



- ▲ Access to the latest U.S. and world news with Reuters®
- ▲ More than 50,000 software files and fast, easy downloading
- ▲ Multi-player graphic games
- ▲ Compton's searchable encyclopedia
- ▲ Clubs, special interests, and hobbies

See other side for details about your FREE trial of America Online!



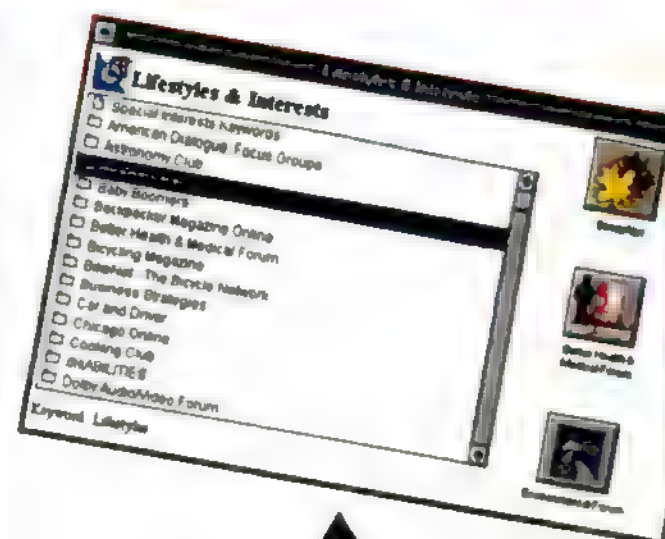
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 9096 VIENNA, VA

POSTAGE WILL BE PAID BY ADDRESSEE

AMERICA®
Online

8619 Westwood Center Drive
Vienna, VA 22182-9806



AMERICA®
Online

1-800-827-6364, Ext. 4621



able and attractively designed templates for commonplace spreadsheet documents—are available via the File New command, so you can't miss them. Included in the set is a skeleton with buttons and macro code, so you can easily design templates for your own frequently needed documents. Save your own templates in the new WT4 format, and they too will pop up in the list of options offered by File New. Excel has long had comparable capabilities (without the supplied templates) but has managed to make them almost invisible.

Release 5.0 also provides a few other productivity and usability advances. The SmartIcons are now smarter with new bubble legends, for example. Creating label or formula sequences is easier with "drag-and-fill" (a new mouse equivalent for an existing menu command). Print ranges can be centered vertically or horizontally on the page, and you can now sprinkle your worksheets with multiple currency symbols. But there is much in 1-2-3 that could be made easier still.

Lotus 1-2-3 for Windows, Release 5.0, is an improving but uneven product, with particular appeal for those whose modeling requires input from multiple users.

Microsoft Corp.



Many of the significant new features in Microsoft Excel, Version 5.0, are about power without pain. One of the most appealing of these is the Tip Wizard—an agent that watches you work and diplomatically suggests simpler ways to accomplish common tasks. If you don't want to be distracted, you can let the tips accumulate and read the whole lot at once.

In a product so rich in keyboard shortcuts and other ways of accomplishing tasks, this wizardry is most welcome. With it, even veteran Excel users will learn more efficient ways of working. And it's just one manifestation of Microsoft's heralded IntelliSense technology. When you sort a list that includes headings, for example, Excel automatically recognizes the headings and, as a default, excludes them from the sort. When you apply one of the program's dozen or so canned formatting combinations to a range, the program spots your headings and totals and uses

1	Month	Salesperson	Product	Units	Sales
2	Jan	Buchanan	Dairy	3633	\$4,448
3	Jan	Buchanan	Produce	9025	\$5,594
4	Jan	Buchanan	Produce	5408	\$29
5		Buchanan Total			\$10,071
6	Jan	Dawko	Dairy	9560	\$5,544
7	Jan	Dawko	Produce	5511	\$2,688
8	Jan	Dawko	Dairy	9185	\$5,081
9	Jan	Dawko	Produce	9441	\$9,662
10		Dawko Total			\$24,973
11	Jan Total				\$35,044
12	Feb	Buchanan	Produce	9528	\$5,930
13	Feb	Buchanan	Dairy	9342	\$1,450
14	Feb	Buchanan	Dairy	5889	\$4,952
15	Feb	Buchanan	Dairy	3030	\$5,010
16	Feb	Buchanan	Dairy	5178	\$3,571
17	Feb	Buchanan	Produce	3219	\$3,106
18	Feb	Buchanan	Produce	744	\$2,665

Clicking the outline buttons next to a subtotaled list in Excel 5.0 switches you between summary and detail views of the list.

formatting to set them off. When you use the GOTO command, Excel remembers where you went from; on your next GOTO, the cell you left behind is proposed as a default, and other recent destinations appear in a list box.

Excel is the only major spreadsheet that automatically gives you a date format when you enter a NOW formula, that provides shortcuts for duplicating the content or formula of the cell above, that lets you expand data series in a chart by dragging cells to the chart, or that allows you to adjust both margins and column widths from the print previewer. It is also the only one that provides optional adding-machine-style fixed-decimal data entry, that provides built-in formats with aligned currency symbols and parentheses, or that facilitates the debugging of formulas by letting you recalculate subexpressions right on the formula bar.

UNDER ANALYSIS

Usability is only half of the equation. A spreadsheet's merit is also gauged by its analytical breadth and depth as well as its suitability as a development platform. Here, too, Excel excels.

Excel 5.0 (like Lotus 1-2-3 for Windows, Release 5.0) offers major improvements in on-sheet database management. A new Autofilter command performs the equivalent of the old Database Extract without the criterion formulas. To indicate which records you want to see, simply pick values from the drop-down lists that Excel displays next to each field heading.

A new Subtotals command tallies list

values at points where field values change. The subtotal formulas may be based on any of the standard aggregation functions—sum, average, minimum, maximum, and so on. Subtotals may be nested to any level, and Excel automatically outlines the subtotaled list.

To assist with importing delimited database files and unlimited reports, Excel now provides a Text-Import Wizard. Here you may specify one or more delimiting characters, exclude rows and columns you don't need, specify the formatting to be applied once the data

arrives in Excel, and inspect the parsing of your data before it's actually imported. A similar Wizard assists with the pasting of Clipboard data.

PIVOTAL WIZARDRY

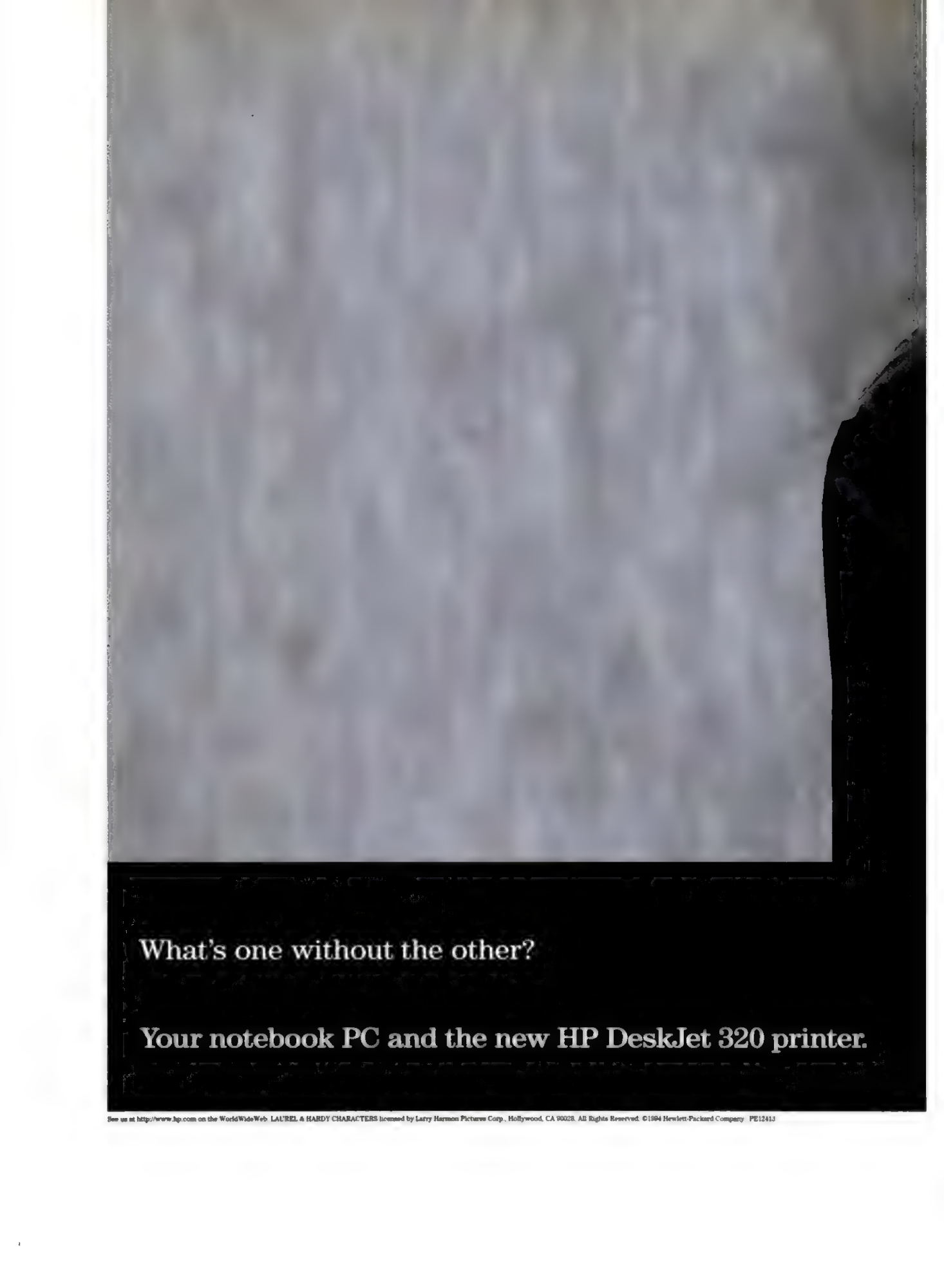
To help you make sense of flat-file data either on your worksheet or in an external (ODBC-compliant) file, Excel now offers a PivotTable Wizard—a crosstab generator on steroids. This Wizard lets you transpose crosstab field headings among row, column, and page dimensions until you find exactly the data slice that serves your current needs. It also offers a wealth of internal-calculation commands, letting you find percents of totals, period-to-period changes, and so on.

The PivotTable Wizard is a rich reporting tool. Its calculation features and display options are stronger than those of Quattro Pro's Data Modeling Desktop, and its integration with the rest of Excel makes it more serviceable than the linkup Lotus now provides between 1-2-3 and Approach.

Applications developers can now embed dialog-box controls directly into Excel worksheets without creating custom dialog boxes. Right-clicking the spinner, check box, radio button, or list box, for example, and filling out a simple property sheet turns the control into an input device for a given cell.

LINGUISTIC TALENT

The big news for developers, however, is the addition of Microsoft Visual Basic, Applications Edition, Excel's new macro



What's one without the other?

Your notebook PC and the new HP DeskJet 320 printer.

See us at <http://www.hp.com> on the WorldWideWeb. LAUREL & HARDY CHARACTERS licensed by Larry Harmon Pictures Corp., Hollywood, CA 90028. All Rights Reserved. ©1994 Hewlett-Packard Company PE12413



High-quality mobile printing.

*Compact and light,
just 4 lbs.*

*Upgradable to color for
just \$49. And ColorSmart
technology makes it
vibrant and easy to use.*



*\$379 list price, actual
price may be lower.*

*Bundled with optional sheet
feeder for a list price of \$455.*

*Check the Yellow Pages for
the HP dealer nearest you.*

HP Printers



HEWLETT
PACKARD

language (and only the first of installment Microsoft's *complete* cross-application programming tool). VBA provides a far simpler syntax and a richer programming environment than Excel's original XLM language. It also comes with easy-to-use dialog and menu editors, an "immediate window" comparable with that in other Visual Basic implementations, and a full set of debugging tools. Excel VBA macros can be used to drive other programs that expose themselves via OLE automation. Microsoft will continue to support but will not expand the XLM language, and XLM routines can be called from VBA macros.

To facilitate collaborative projects, Excel now includes support for Notes/FX, the protocol that allows designated spreadsheet ranges to update fields in Lotus Notes databases and vice versa. Excel also offers both broadcast and sequential mail services—but for entire files only. 1-2-3's range-routing feature provides greater versatility, and Lotus's Version Manager is a more adept scenario manager than Excel's.

Excel does not do maps. It also lacks the publish-and-subscribe capability offered by Quattro Pro's OBEX technology. Its implementation of three-dimensionality is incomplete (range names, chart series, and certain kinds of formulas cannot be applied across multiple sheets). The charting component—for all its feature richness—is still apt to bewilder the user at times. But Excel covers nearly all the bases extraordinarily well and has a level of usability that its competitors have yet to attain.

WordPerfect, The Novell Applications Group

• Quattro Pro 5.0 for Windows, Workgroup Edition

Quattro Pro 5.0 for Windows, Workgroup Edition, is a product in transition. At press time, the package was not only near the end of a revision cycle, it was also under new ownership, having been sold by Borland International to Novell earlier in the year. Quattro Pro 6.0 entered beta testing in midsummer; Novell said it would release the new version sometime during the third quarter.

Most of the Borland Quattro Pro for Windows staff also went to Novell, so existing users have every reason to anticipate consistency in support. But users should expect to see cosmetic changes in future versions of Quattro Pro for Windows, as well as tighter integration with its suite mates.

STRONG SUITS

Quattro Pro's major strengths are the depth of its analytic features, its system for publishing files and ranges across both LANs and MCI Mail, and its built-in slide-show facility. Its principal weakness was slow performance: On our tests, Quattro Pro proved to be the slowest of the three spreadsheets. Quattro Pro also lacks an auditor for tracing formula dependencies and comes up short in on-

particularly strong.

The charting component of the program incorporates additional analytical commands. These allow you to convert a raw data series to a moving average, a linear fit, or an exponential fit. With Quattro Pro's unique aggregation command, you can roll time-series inputs into larger time intervals. For example, you might aggregate weekly sales numbers into monthly averages, sums, maxima, and minima. (Unfortunately, for those who plot securities prices, the aggregation command will not generate period-ending or high/low/close values.)

GROUP WORKS

To facilitate workgroup communication, Quattro Pro includes OBEX (Object Exchange) a publish-and-subscribe technology somewhat akin to but more

elaborate than the sharing technology supplied by System 7 on the Macintosh. The originator of a project publishes it to make it available to others; colleagues in turn may subscribe to it much as they might subscribe to a traditional publication.

Two things set this system apart from simple mail-enabling. First, the publisher may specify the revision depth of the publication. For example, if the revision depth is set to three, recipients will always have the three most recent versions. Second, OBEX documents can be

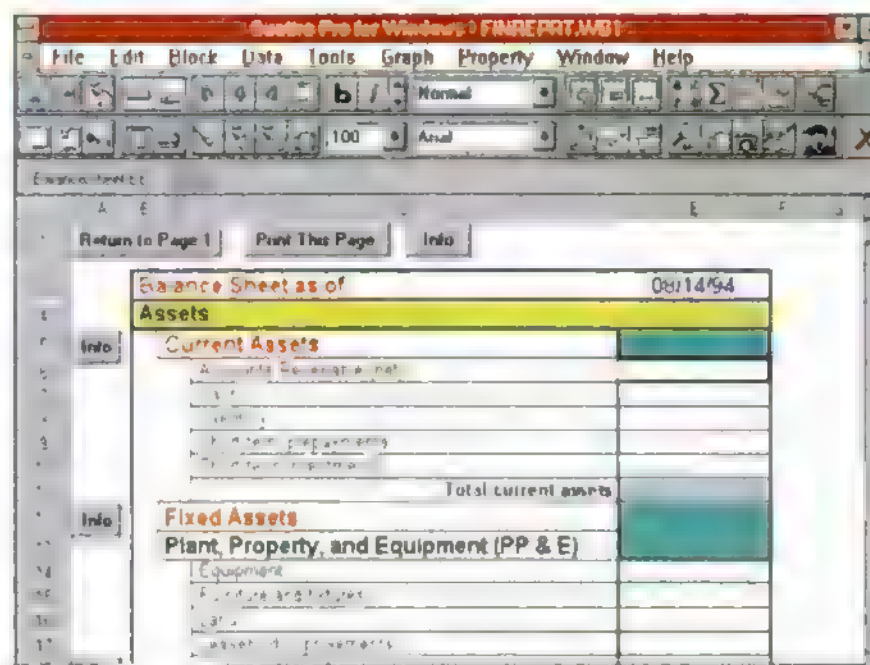
transported not only via cc:Mail for Windows, MAPI applications, and MHS but through MCI Mail or directly over a LAN (that is, with no mail system at all).

IMMINENT ARRIVAL

Looking ahead, here is what you may expect to see in Version 6.0. (These observations are based on beta software and are subject to change.)

Quattro Pro's appearance will be changed to achieve a cleaner look and visual consistency with WordPerfect. Quattro Pro 6.0 and WordPerfect will use a common set of file-related dialog boxes and offer similar file-management services.

The two icon palettes at the top of Quattro Pro's window will be replaced by



Quattro Pro for Windows automatically incorporates sheet names into cell references. Here the current cell is BalanceSheet:E6.

sheet database management when compared with its competition. The program includes the Database Desktop, a separate tool built on the user interface of Paradox for Windows, used for querying external DB, DBF, and SQL files. For internal queries, however, the Quattro Pro user is stuck with archaic criteria-range methods of early DOS spreadsheets.

Quattro Pro's function library, the largest of any major spreadsheet program, reaches beyond the standard arithmetic, financial, calendar, and descriptive statistical items to handle all sorts of specialized tasks: calculations involving complex numbers, conversions between numbering systems, comparisons of stock options, inferential statistics, and more. The financial and calendar functions are

The Toshiba T4700C Series

A notebook so powerful, it breaks the sound barrier.



The Toshiba T4700C Series can run your most intense applications or even help you run a presentation. With its SL Enhanced i486™DX2 50MHz processor, it easily handles graphics-rich programs. The built-in multimedia capabilities let you create and give breakthrough presentations anywhere. And Toshiba's advanced color gives you a choice of either stunning TFT or eye-popping Dynamic-STN dual-scan displays. With so much going for it, buying a T4700C Series notebook is a very sound decision. **For a Toshiba dealer near you, call 1-800-457-7777.**

Incredible Sound:
An integrated sound system and built-in speaker let you enjoy fantastic sound whenever you want.



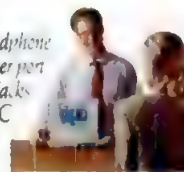
The only computer you'll ever need: The optional Desk Station IV, lets you instantly connect to your network, printer, VGA monitor, mouse, and full-size keyboard.



Two separate PCMCIA slots: A 16mm and a 5mm slot are your keys to expansion—for modems, storage and more.



A multimedia roadshow: Headphone or external speaker port and microphone jacks make the T4700C Series perfect for presentations.



T4700CT

- 9.5" dia. color TFT-LCD active matrix display
- 256 simultaneous SVGA colors at 640x480 resolution

T4700CS

- 9.5" dia. color Dynamic-STN dual-scan display
- 256 simultaneous SVGA colors at 640x480 resolution

BOTH MODELS

- 50MHz SL Enhanced i486™DX2
- 8MB RAM expandable to 24MB
- 200/320MB HDD
- Two PCMCIA slots (16mm and 5mm)
- Integrated graphics accelerator
- VL local-bus video
- Built-in microphone
- WAV audio capabilities

- Audio jacks: headphone/speaker, microphone
- NiMH battery for extended life
- QuickCharge battery recharge system
- 3.5" 1.44MB floppy disk drive
- BallPoint™ 2.0 mouse with QuickPort™
- MaxTime™ Power Management system
- LCD status icon bar
- DOS™, Windows™, and Windows Sound System™ software pre-installed



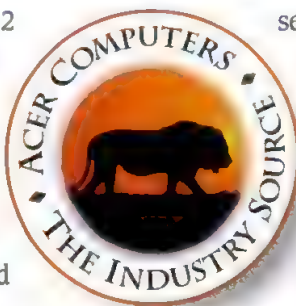
In Touch with Tomorrow
TOSHIBA

Don't blow it
on a server
with no track
record...



The value of a great open-system server.

We've built dependable servers for more than 12 years, and we back what we build with a 3-year warranty and 1 year of on-site service. High performance, multiprocessor AcerAltos servers are manufactured in ISO-9000 certified facilities for maximum quality assurance. They're designed and built as servers from the ground up, not just "souped up" PCs. AcerAltos pioneered



server technologies that help you get the most out of high-end UNIX® applications. And their open-systems design supports Novell® NetWare®, Windows NT™, Banyan® Vines® and Altos® SCO® UNIX, so you can defuse departmental OS wars. Arm your firm with AcerAltos. Their performance snuffs out the competition.

Choose one
with years of
experience.
AcerAltos.

since 1982



SERVER COMPARISON

AcerAltos 7000

Fastest CPU Available:	Pentium 90MHz
Maximum RAM Available:	256MB
Available Expansion Slots:	7 EISA/2 VLB
Hot-Pluggable Bays (RAID):	8
Cost:	Over \$1,000 less

Compaq ProLiant™ 1000

Pentium 60MHz
144MB
7 EISA
5

Acer

The Industry Source Means Value.

Call 1-800-581-ACER for more information.

AcerXpress Fax Back System: 1-800-554-2494 Acer BBS: 1-408-428-0140

Acer and the Acer logo are registered trademarks of Acer America Corporation and Acer, Incorporated. Altos is a registered trademark of Acer America. All other brands and product names are trademarks or registered trademarks of their respective companies. © 1994 Acer America Corporation. All rights reserved.

Performance Tests: Spreadsheets

Since our last spreadsheet roundup, both Lotus 1-2-3 for Windows and Microsoft Excel have undergone significant revisions. Changes to both packages were focused primarily on features, but in 1-2-3's case, attention was also paid to enhancing performance. 1-2-3's performance here was excellent—a decided improvement over its below-average showing in our last roundup.

What the Numbers Mean

Lotus has apparently taken 1-2-3's previous performance scores to heart and made some far-reaching changes to its spreadsheet package. During our testing, the most substantial performance improvement we witnessed was on the Cut-and-Paste test, where 1-2-3 went from an abysmal showing in our last roundup to a respectable third-place score (which was nevertheless twice as slow as that garnered by the second-place finisher, Quattro Pro for Windows). The recalculation engine, which helped the package score well in our last roundup, secured the best recalculation times here. 1-2-3 also fared very well on the Database Sort test.

Although Version 5.0 of Excel has many users complaining about performance losses, it was quite competitive with the other products in this roundup. In fact, Excel came out on top on half of our tests. User perceptions of diminished speed may well relate more to the program's slow responsiveness (when performing common tasks such as opening dialog boxes, for example) than to actual performance.

Although a new version of Quattro Pro for Windows—Version 6.0—is imminent, we were unable to test it in time for this roundup. Version 5.0, Workgroup Edition, which we did test, remains unchanged since our last evaluation, so our previous observations still apply. The product was the slowest on all but the Cut-and-Paste test. Clearly, WordPerfect will need to consider improving performance in the next release.

How We Tested

We performed all tests on a Compaq Deskpro 486/33M equipped with a 340MB hard disk and 8MB of RAM running DOS 6.2 and Microsoft Windows 3.1.

We generated test files in both .WK1 and .WK3 formats and imported these into each package. We translated formulas into the syntax of the program being tested and saved files in that program's native format. We tested each package with recalculation set to manual and the Undo feature disabled. Times are in seconds elapsed; in all cases, a shorter time is better.

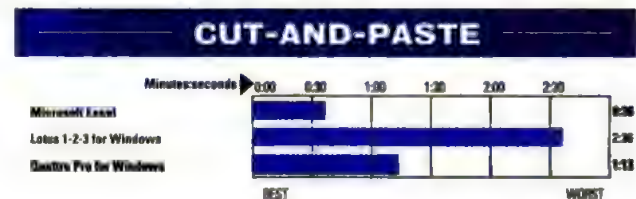
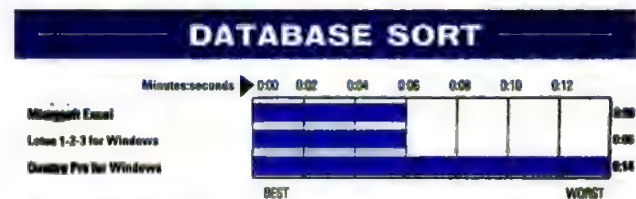
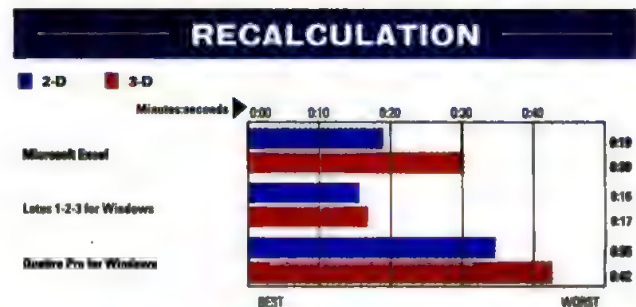
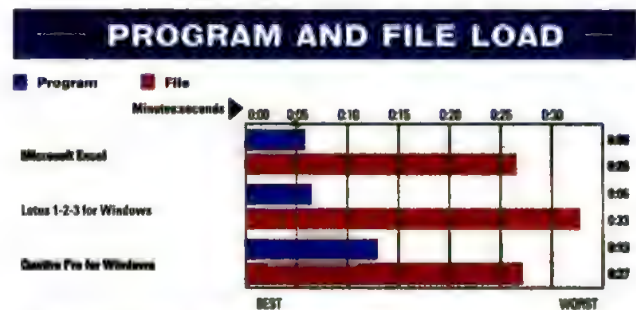
TEST CATEGORIES

The **Program and File Load** tests measure the time it takes a spreadsheet package to load into memory and await input. We then measure the time it takes a package to load our recalculation spreadsheet test file from disk.

Our **Recalculation** test file uses a combination of mathematical, lookup, time/date, financial, and string functions. The test is split into two subtests, one involving a spreadsheet workbook consisting of a single page (2-D), and a second involving a spreadsheet that includes multiple pages with cells referencing cells on other pages (3-D).

The **Database Sort** test times a two-key sort on a database of 5,000 rows and 13 columns. The primary key is sorted in ascending order; the secondary is sorted in descending order.

Our **Cut-and-Paste** test measures the time it takes to move a large block of cells from one area of a spreadsheet to another. We carry out the move using the Windows Clipboard, with recalculation set to manual. Moving the rows causes formulas in cells throughout the spreadsheet to be updated.



a single, immovable palette and a live status bar (much like the ones used by Lotus's Windows programs). At the bottom, the notebook-page scroll bar will be replaced by an easier-to-use set of VCR-style controls. While the user manipulates a worksheet scroll bar, a pop-up window adjacent to the scroll bar will indicate the current row or column position.

Word-wrap, vertical text, and colored rules will be available. The worksheet will incorporate a separate drawing layer, allowing you to annotate models with lines, boxes, ellipses, and arrows. You can do this in Version 5.0 but only by embedding a text graph on the worksheet. To assist with formula entry, Quattro Pro 6.0 will provide both a Cell-Entry Coach and a Formula Composer. The latter diagrams a formula's logic (handy for decomposing a faulty formula) and provides information about functions—what they do, what arguments they expect, and what values their current arguments are returning.

OLE OLE

Quattro Pro 6.0 will be an OLE 2.0 application, offering drag-and-drop between files and programs as well as in-place editing. Version 6.0 will also support the OLE automation component of OLE 2.0, but only as a controller. This means the Quattro Pro developer will be able to drive certain other OLE 2.0 programs but not vice versa.

The new version will offer Experts (step-by-step guides, comparable with Microsoft's Wizards) for creating budgets, bullet charts, and "what if" tables. The Presentation Advisor will be built in, providing assistance with chart formatting as well as slide-show assembly. Presenters will also be able to create master background slides with the assistance of the presentation-adviser technology.

Version 6.0 will retain OBEX but will also include a conventional Send command for the benefit of those who want to mail but do not care to publish.

Based on what we've seen, Quattro Pro 6.0 will remain strongest in the areas of specialized analytics and presentation-quality graphics. Its database features will remain weaker than those of Microsoft Excel and Lotus 1-2-3 for Windows.



Databases

INTRODUCTION AND REVIEWS BY RICHARD V. DRAGAN

Given the increasing need in today's organizations for complex analysis and reporting of data from disparate sources, an easy-to-use database with strong connectivity support is a must. Users require—and deserve—interfaces that let them get to their data quickly. Fortunately, the database products in today's application suites can oblige.

Of the packages we review here, Lotus Approach for Windows, Release 3.0, clearly offers the most user-centric design, with an elegance that comes close to the simplicity of a flat-file database. Both Microsoft Access, Version 2.0, and Paradox 5.0 for Windows, Workgroup Edition, are capable of getting even beginners up and running quickly as well. Each product offers sophisticated on-line assistance—in-

cluding automated form and report generation with Wizards, Experts, or Smart Assistants—that gets you working fast. By tapping such on-line resources, end users can design even sophisticated forms, queries, and reports on their own with a minimal amount of effort.

FLEXIBLE CONNECTIONS

All three suite-based databases offer excellent access to both SQL servers and non-SQL data. All three support ODBC (Open Database Connectivity). In addition, Access offers a revised ODBC driver for better performance; Paradox and Approach provide proprietary non-ODBC drivers for selected databases for the same reason. All three products offer easy visual tools that let users quickly link multiple tables.



Databases

• Lotus Approach for Windows 3.0

Selecting a suite-based database package for Editors' Choice honors proved a delicate task, largely because database products cover a much wider spectrum of power, programmability, and ease of use than do word processor and spreadsheet pack-

ages. While database tools for professional developers clearly have a place in the world, the office suite is probably not that place. If anything, the suite context favors end-user-oriented ease of use over sheer power; by this measure, Lotus Approach for Windows, Release 3.0, stands clearly above its competitors.

All three contenders offer automated tools for getting to data quickly, good connectivity to SQL and non-SQL databases, and strong reporting capabilities. Approach, though, is at least a step ahead in user-interface design: With intuitive enhancements such as tabbed dialogs, Fast Format style painting, and

PowerClick reporting, it's the easiest of the three to use. Approach's other special strengths include an impressive level of integration with Lotus 1-2-3 spreadsheets and Lotus Notes databases.

Clearly, both Microsoft Access, Version 2.0, and Paradox 5.0 for Windows, Workgroup Edition, have more to offer database developers. But Approach offers ordinary users the convenience of a flat-file product along with the power of a relational database. The result is not merely cosmetic; this is a product that puts real database capability into the hands of suite users more quickly than its peers.



THE PERFECT DATABASE NO MATTER WHAT YOU'RE

*Support for Microsoft Access is no charge; however, normal telephone company charges apply. Microsoft support services are subject to Microsoft's then current prices, terms and conditions, and are subject to change without notice. © 1994 Microsoft Corporation. "DYN" and "IntelliSense" are trademarks of Microsoft Corporation. Outside the United States and Canada, call your local Microsoft subsidiary at 206-766-8661. Customers who are deaf or hard of hearing can reach Microsoft toll-free 1-1-1-1111 services by calling 800-892-8242. registered trademarks and IntelliSense and Rushmore are trademarks of Microsoft Corporation. Paradox is a trademark of Borland International, Inc.



Used to be the expression "powerful end-user database" was like "the Long Island Expressway" or "jumbo shrimp."

A contradiction in terms.

Of course, that was before the introduction of Microsoft Access® relational database system 2.0: the database that's as powerful as it is easy to operate.

Are you a seasoned developer? Or are you working with a database for the first time? As people are discovering, it's no longer an issue. Because with Microsoft Access, routine tasks are automatic. And complex tasks aren't complex at all.

Do you have to create a table for your data? Just click on the Table Wizard and you'll be led through the process step by step.

Have to add a functional button to a form? Use the Command Button Wizard. (Microsoft Access will even write the code for you.) Have to locate some hard-to-find data? Let the Query Wizard hunt it down. Have to set up a mail merge between Microsoft Access and Word? Click on – you guessed it – the Mail Merge Wizard.

What is it that makes this wonderful stuff so easy? Something we call IntelliSense™ technology: a feature unique to the Microsoft® Office family of programs, and one reason why Microsoft Access has garnered

so much critical acclaim.

Suppose you're ready for something more adventurous. Like developing a database application of your own. Microsoft Access can help you do just that. Pose a query and its Rushmore™ query technology will provide an answer – not quickly, but immediately. Revise a piece of data and that revision will be reflected wherever your data is used – automatically. Plus, no matter where your data happens to be stored – Paradox™, Microsoft SQL Server™, you name it – with Microsoft Access you can, well, access it.

As if that weren't enough, even finding a helping hand is pretty easy. Microsoft Access comes with unlimited product support at no service charge.*

It adds up, clearly, to the first database that does everything you want – precisely the way you want to do it. And we find nothing contradictory about that. For the Microsoft retailer nearest you, call (800) 240-4782, Dept. 3HY.



Microsoft Office

Suite buyers may also need to consider the issue of applications development, and it's here that our three products vary the most in emphasis and ability. Most users would rather not have to face programming just to accomplish common database tasks. On the other hand, most will eventually want to automate at least a series of repetitive tasks, such as creating and printing reports, building compound documents, and creating small standalone applications. All three products offer easy, basic automation through scripting and at least partial support for OLE 2.0, and Access (via Access Basic) and Paradox (via ObjectPAL) provide full-powered database programming languages. Only Approach offers tight links to Lotus Notes.

Those with specific database-related requirements, such as heavy applications development or strong integration with Notes, may favor a particular suite for these reasons, but for general database use, you can't go too wrong with any one of these three packages.

Lotus Development Corp.



EDITORS' CHOICE

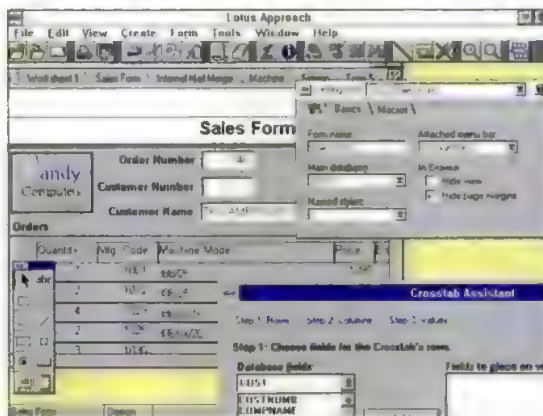
Lotus Approach 3.0

As one of first serious Windows databases on the market, Lotus Approach has always been grounded in the conviction that the Windows interface can provide end user accessibility without sacrificing relational power or database connectivity. The latest version, Lotus Approach for Windows, Version 3.0, validates this idea, increasing ease of use substantially for a relational database product. While the package still lacks a true development language, its elegant, intuitive interface and enhanced reporting capabilities make it a powerful querying and reporting tool.

USER FOCUS

Approach lets you avoid the details of using a database. As you open the product for the first time, you can choose from more than 50 sample databases, from Accounts to Wine List. If you've never used a database before, Approach gets you off the ground quickly and lets you create simple databases for common business and personal applications such as contact lists, invoices, orders, products, and shipping logs.

While Approach has a strong end-user focus similar to flat-file databases such as Claris's FileMaker Pro, it is a truly relational database. It supports the use of up to 50 tables at a time (250 for SQL tables).



Among many user enhancements in Approach is the InfoBox. To set the attributes of a field, choose a category and view only those attributes you want to change.

The Join dialog box makes linking tables easy; you just connect fields from different tables using the mouse. You can mix and match tables of different formats in the same data model.

Unlike the other database products in this roundup, Approach does not use its own proprietary database format. Rather, it relies on good connectivity to existing database formats, using dBASE (.DBF) files by default. For faster performance, Approach 3.0 provides its own PowerKey drivers to connect with dBASE III and IV, Oracle, Paradox 4.x, and SQL Server databases. It also connects to any ODBC-compliant data source.

Approach uses its own indexing mechanism to build a Smart Index. This can take a few minutes on large tables, but once it's done, Approach is ready to provide speedy querying and reporting.

FORMS ASSISTANCE

Approach features a crew of Smart Assistants (similar to Microsoft's Wizards), which generate forms and reports automatically. One advance here is the use of a tabbed dialog-box control that allows you to skip back and forth between groups of options as you work.

Approach's form-design mode, which you turn to once your form is created, is particularly appealing. The program's developers have put a great deal of effort

into making common tasks easier: Double-clicking a selected control brings up its InfoBox, which uses the handy tabbed dialog interface to set visual appearance and other attributes. There are pages for

Basics, Font Style, Frame Style, and Macros, so it's easy to get at just the properties and styles you want to change. One enhancement, Fast Format (first introduced with Ami Pro), lets you pick up existing styles from one control and paint them onto any others you choose. This feature is so useful that you'll wonder how you ever designed forms without it.

You can also attach macros to individual fields in an Approach form. Approach does not give you the precise control over events that other products in this roundup provide, but you

can, for example, set a field value or commit a record whenever a specified field has changed.

INVESTIGATIVE REPORTER

For searching records, Approach offers query-by-form capability. You can search for records with either single or multiple matching fields. Approach builds indexes intelligently as you search on fields, allowing faster searches when you search on the same fields with different conditions.

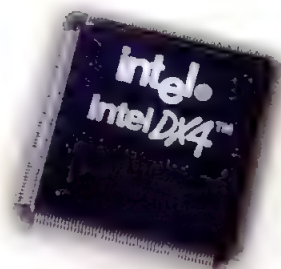
Approach's reporting capabilities are strong and easy to access. The process of generating common types of reports such as group, mailing-label, summary, and crosstab views begins with automated Smart Assistants. Once you've created a report, customizing it is easy. Further, Approach lets you look at your data in multiple ways without requiring you to design an entirely new report each time. The PowerClick feature, for example, lets you use crosstabs to transpose rows and columns effortlessly for just the view you want to see. Also, charting and graphing have been added in this release, filling a gap in the previous version of this product.

Developers and power users who need more programmable solutions will be out of luck here, as Approach does not have its own programming script language. It does, however, support 38 macro func-

**The Highest Point In
Notebook Computing.
The New ZEOS
Meridian.**



The ZEOS Meridian™ The Ultimate Notebook Line.



Highest Quality, Superior Performance & Power Up To 100MHz

Finally, desktop power to go. Travel around the world or to the highest peak. Work at home, in the office or on a plane. With the ZEOS Meridian line of color notebooks, the choices are endless and the power is unearthly.

What makes the Meridian the perfect workmate? Durable, sturdy construction that will travel anywhere, incredible power and performance that will take you to new heights, and more options than a road map. To meet your needs exactly, we offer you power, speed and memory choices—genuine Intel 486SX-33, 486DX2-50 or DX4-100

microprocessors; 4 or 8MB

RAM user upgradable to

20MB; and IDE hard drives

from 175MB to 350MB.

The Meridian includes the

latest and hottest features: high-speed local bus video for super-fast video performance, two PCMCIA slots, and an 84-key keyboard with inverted "T" arrow keys and a new integrated TruePoint™ pointing device.



Moving around your desktop is a breeze with TruePoint™ the conveniently located, easy-to-use, integrated pointing device.

Get desktop power in a notebook.

For the fastest computing around, the Meridian 400C and 800C are both available with Intel's DX4-100 microprocessor.

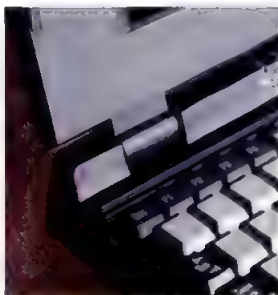


ZEOS gives you award-winning service & support. No company has won more PC Magazine Readers' Choice for Service & Reliability awards than ZEOS—six in all. Plus, we were the first to provide 24-hour toll-free tech support—every day.

ZEOS Meridian 400 is also available with a monochrome backlit display (\$300 off package price).

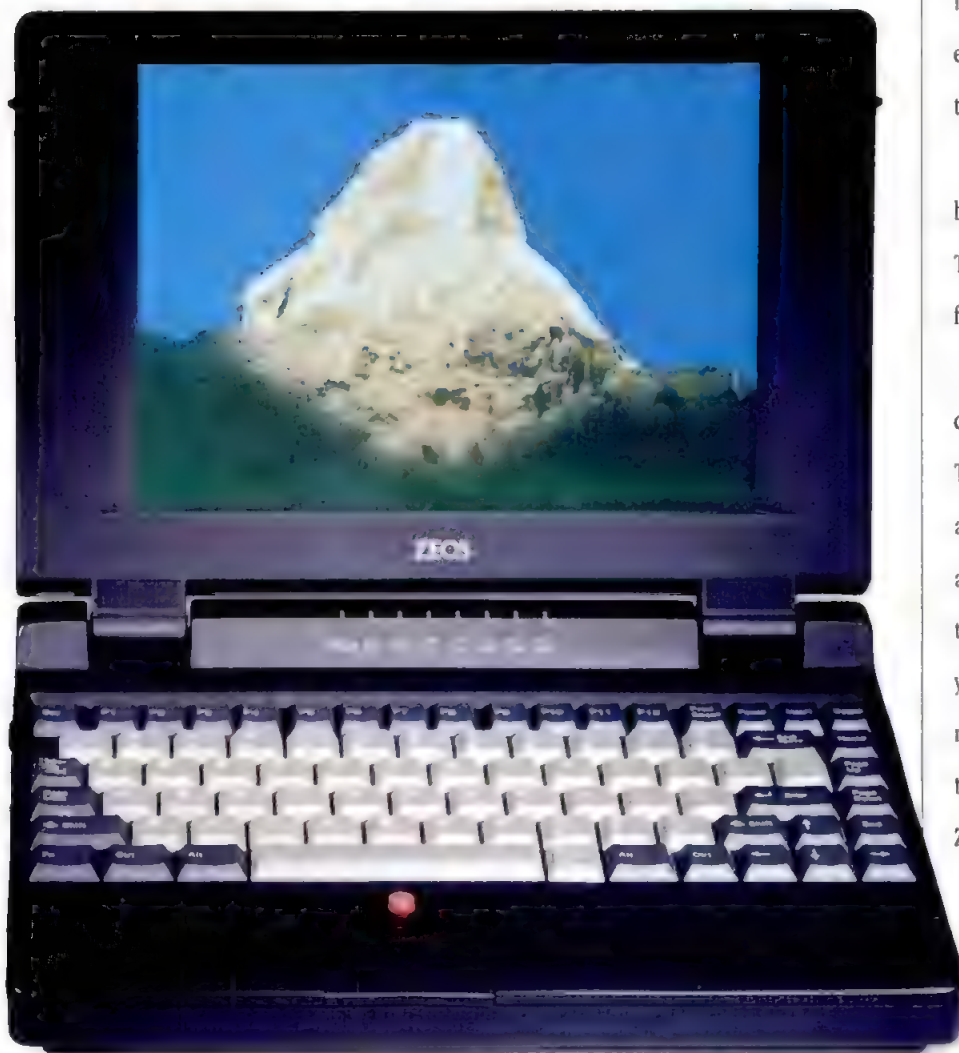


With the ZEOS Meridian 800's removable hard drive, it's easy to upgrade your system to a larger capacity, archive your documents, and keep your data secure.



The ZEOS Meridian features solid, durable construction for a long life—even after the abuse of numerous road trips. The Meridian 400 is molded from a special carbon-fiber material that cuts weight and improves durability.

To save energy and battery life, all ZEOS notebooks include full power management features.



Meridian 400C Subnotebook

If you like to travel light, the Meridian 400C, at 39 pounds, is your ideal traveling companion and ultimate subnotebook.

The 400C features a 7.8" diagonal, STN color, backlit screen (backlit monochrome display is also available); two Type II PCMCIA slots; and an ergonomic palm rest. Packages 2 and 3 also include an external ultra-light (9 oz.) 3.5" 1.44MB floppy drive.

Meridian 800C Notebook

At 6 pounds and change, the Meridian 800C is light enough to travel anywhere yet it's large enough to use for presentations and regular desktop computing. You get the best of both worlds!

The 800C also includes a dual-scan color backlit screen for easy viewing; two Type II or one Type III PCMCIA slots; an internal 3.5" 1.44MB floppy drive; and an ergonomic palm rest.

Reach the highest point in notebook computing with the new ZEOS Meridian Line. There's no limit. With its durable design, awesome performance and technologically-advanced features, you'll be able to keep in touch with the office, write memos, organize your calendar and work on priority documents—wherever you are. For power that will take you to the ends of the Earth, call your ZEOS Systems Consultant today.

800-554-7172

**24 Hours
a Day**



ZEOS Meridian™ Notebooks.

Standard With Every ZEOS Meridian:



- Intel 486SX-33, 486DX2-50 or DX4-100 microprocessor.
- 8K (DX4: 16K) internal system cache.
- RAM expandable to 20MB.
- IDE hard drive upgradable to 350MB.
- PCMCIA slots: 400C: 2 Type II, 800C: 2 Type II or 1 Type III.
- Local bus video with 1MB video RAM.
- Display: 640 x 480 color VGA backlit LCD, up to 256 colors. 400C: 7.8" diagonal STN color. 800C: 10.3" diagonal DSTN.
- Supports an external SVGA color monitor at resolutions up to 1024 x 768.
- 84-key keyboard with embedded numeric keypad and 12 dedicated function keys, inverted "T."
- Integrated TruePoint™ pointing device.
- Replaceable, rechargeable NiMH battery.
- Serial port, enhanced parallel port, external VGA video port, external keyboard or PS/2 mouse port (800C includes both). 400C also with external floppy drive port.
- Full power management features include Low Power mode and programmable Standby features.
- AC-DC adapter with full range from AC110-240V to DC.
- 400C: 7.8" x 10.2" x 1.7"; 3.9 lbs. 800C: 8.9" x 11.7" x 1.9"; 6.3 lbs.
- EPA Energy Star compliant.
- FCC Certified Class B; UL Listed.
- ZEOS Customer Satisfaction Package.

Processors	Package 1		Package 2		Package 3	
	400C	800C	400C	800C	400C	800C
486SX-33	\$1995 Lease \$73/mo.	\$2295 Lease \$84/mo.	\$2295 Lease \$84/mo.	\$2495 Lease \$91/mo.	\$2595 Lease \$95/mo.	\$2795 Lease \$102/mo.
486DX2-50	\$2195 Lease \$80/mo.	\$2495 Lease \$91/mo.	\$2495 Lease \$91/mo.	\$2695 Lease \$99/mo.	\$2795 Lease \$102/mo.	\$2995 Lease \$110/mo.
DX4-100	\$2495 Lease \$91/mo.	\$2795 Lease \$102/mo.	\$2795 Lease \$102/mo.	\$2995 Lease \$110/mo.	\$3095 Lease \$103/mo.	\$3295 Lease \$110/mo.
	➤ 4MB RAM ➤ 175MB IDE hard drive ➤ 800C: Internal 3.5" 1.44MB floppy drive ➤ MS-DOS 6.2		➤ 4MB RAM ➤ 260MB IDE hard drive ➤ 3.5" 1.44MB floppy drive, 400C: External, 800C: Internal ➤ Custom carrying case ➤ MS-DOS 6.2 ➤ Microsoft Windows for Workgroups 3.11 ➤ Lotus Organizer		➤ 8MB RAM ➤ 350MB IDE hard drive ➤ 3.5" 1.44MB floppy drive, 400C: External, 800C: Internal ➤ Custom carrying case ➤ Extra battery ➤ MS-DOS 6.2 ➤ Microsoft Windows for Workgroups 3.11 ➤ Lotus Organizer	

\$300 off with monochrome display! (400C only)

Favorite Options

Hard Drive Upgrades

175MB to 260MB	\$95
260MB to 350MB	\$145

Memory Upgrades

4MB to 8MB	\$196
8MB to 20MB	\$999
4MB to 20MB	\$1195

PCMCIA Cards by New Media

Networking	
PCMCIA Ethernet adapter	
10 Base T (Twisted Pair)	\$139
10 Base 2 (Coax)	\$169

Modems

PCMCIA 24/96 data/fax modem with Internal DAA	\$149
PCMCIA 14.4/14.4 data/fax modem with Internal DAA	\$199

SCSI Adapter

PCMCIA SCSI II adapter with Corel SCSI 2.0	\$199
--	--------------

Multimedia

PCMCIA 16-bit Stereo Sound Card with Microsoft's Sound System 2.0	\$279
---	--------------

Floppy Disk Drive

400C: External 3.5" 1.44MB FDD (9 oz.)	\$99
--	-------------

Accessories

Custom nylon carrying case	\$79
Custom leather carrying case	\$178

SPECIAL PACKAGE PRICE:

14" SVGA color monitor, keyboard and mouse. (with notebook purchase)	\$399
--	--------------

Power

Extra battery	\$99
Extra AC adapter	\$69
DC-AC adapter	\$69
Telemax surge suppressor	\$69

Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Outside U.S. and Canada: 612-362-1212, Government: 800-245-2449. Purchase Orders, MasterCard, VISA, Am Ex, Discover, COD and affordable leasing programs.

800-554-7172

**24 Hours a Day
365 Days a Year**



Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36 month lease, 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. Novell compatibility is Developer Tested Only. Novell makes no warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside Logo is a trademark of Intel Corporation. ZEOS is a registered trademark. Computers Now! is a registered servicemark. ZEOS Meridian and TruePoint are trademarks of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS).

MER PCM 9410B

CIRCLE 151 ON READER SERVICE CARD.

tions that can be used to create and manage forms and reports and the Customize Menu tool, which lets you create custom menus without programming. With it, we were able to quickly create a small application consisting of several forms and reports, with custom menus to navigate between them.

INTEGRATION FORTE

In addition to the product's OLE 2.0 container capabilities, Approach 3.0's integration with Lotus 1-2-3 is perhaps the strongest link ever built between two desktop applications. Approach lets you access all your 1-2-3 data, maintaining lists with forms and generating the rich variety of Approach reports, including (and especially) crosstabs, from within 1-2-3 itself. You can also use Approach as an input device for 1-2-3 lists by attaching an Approach form to a range of spreadsheet cells.

Approach can act as a front end to Lotus Notes data and also supports Notes/FX. You can even distribute an Approach database via Notes, where it can be modified as a new, standalone database. Approach also lets you send documents via cc:Mail, Notes, or any VIM- or MAPI-compliant mail system.

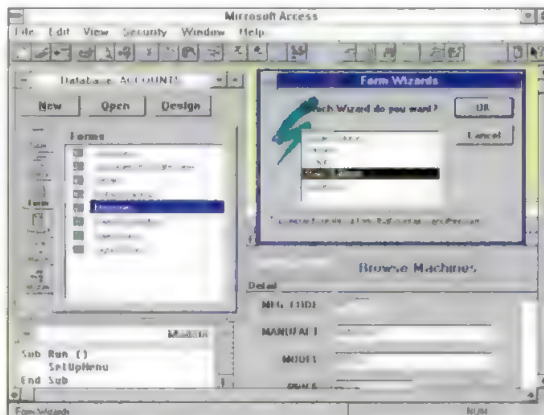
With its superior ease of use and strong connectivity to existing databases, Approach 3.0 should win over a good many users. Even for organizations locked into more traditional DBMSs, Approach can provide an excellent reporting solution for users who need better flexibility in working with data.

Microsoft Corp.

• Microsoft Access 2.0

Building on the winning features of its first version, Microsoft Access, Version 2.0, lets end users build queries and do sophisticated reporting without having to worry about programming. Much of the new prowess comes directly from the on-line assistance of Wizards (automated solution builders) and Cue Cards (in-depth topical help agents), which get end users to their data quickly. For power users and developers, Access's programming language (Access Basic) and strong connectivity support make it a veritable database powerhouse.

The Database Window is the control center from which you manage all the parts of your database, including tables, forms, queries, reports, macros, and code modules. In Access 2.0, just as in Version



Access's Form Wizards let you create data entry screens quickly. To create a form, just select the type of form you want and the tables it will use.

1.x, all these components are contained in a single .MDB file. In addition to its own proprietary database format, Access also easily connects to external tables from any ODBC-compliant database. This lets you mix and match local and remote data seamlessly within your queries and reports.

DESIGNING DATA

Wizards provide consistent on-line guidance for creating tables and designing forms, queries, and reports automatically. Using Access's Table Wizards, you can easily create a working database for a number of common business functions such as Accounts and Invoices and for personal databases such as Video Collection and Investments.

Once you've created your table, you'll want to create data entry screens to add data to it. The Form Wizard generates a number of common views for your data, including tabular, free-form, and embedded master/detail forms. Once you've established the basic look and feel for your forms, you can customize them with the easy-to-use Form Designer, which provides tools for adding text prompts, fields, and controls. Double-click a selected control, and it reveals its Properties window, where you set visual attributes and gain access to several advanced customization features.

PROPERTY POWER

Access adds several powerful new features to the Properties window in Form Designer mode. The Input Mask Wizard lets you create masks that help ensure that your data is correctly entered. Masks for common input types include capitalization, field length, time and date, phone, and ZIP code. The Expression Builder lets you create calculated fields by attaching formulas to specific controls. A third (unnamed) tool used in the Properties window lets you attach code to particular events such as entering or leaving a field.

The Control Wizard makes it supremely easy to solicit user input through lookup-style devices such as check boxes, list boxes, and radio buttons. This Wizard creates these controls and places them on your data-input forms automatically.

ON CUE

Another of Access's help features is Cue Cards, on-line guided assistance for common tasks like creating queries and reports. Cue Cards provide a series of help screens that appear as pop-up windows alongside your own work. As you work on a specific task, Access is always ready to guide you to the next step like a personal coach.

Data models in Access are defined with remarkable ease in the Graphical Relationships window. All it takes to create a query of multiple tables is a drag-and-drop maneuver with the mouse. Access's Query Wizard can automatically build a variety of queries, including crosstabs, groups, and totals. Once built (whether by the Query Wizard or by you), queries can be reused in forms and reports—and even by other queries. To get the most out of Access, however, you'll want to become SQL literate; of the three database products we examine here, Access relies most on SQL to generate queries. Access's SQL window allows you to modify the underlying SQL statements directly to tweak your queries.

The Report Wizards easily create the most common report types, from mailing

labels to complex reports like summaries, groups, and totals. The Report Wizards can build a report from just one table or from a query if more than one table is required for your report. With the AutoReport feature, any query can be turned into an instant report. Included here is the ability to create a Word for Windows mail-merge document from within Access. The Mail Merge Wizard invokes Word for Windows for you, and you then paste fields from a database into your Word for Windows document. Access also includes good charting capabilities in a variety of popular graph styles.

PROGRAMMING: PLAIN AND BASIC

For building simple database applications, Access offers a convenient and comprehensive macro capability that handles common functions such as opening and closing forms, opening databases, or printing reports. Macros are programmed by pointing and clicking macro commands and arguments from pull-down list boxes. It's a truly elegant feature. Further, during testing, the Access Menu Builder allowed us to create a custom menu structure easily.

For serious developers, Access offers Access Basic, a full-featured programming language for manipulating data and forms. The product's debug and code-management capabilities are good, though they are still a step behind those of Microsoft Visual Basic. Access Basic closely resembles Visual Basic 3.0, however, so VB programmers can use their knowledge to get up and developing in Access quickly.

On the integration side, Access is OLE 2.0-compliant, but not fully so. You can, for example, embed Access reports or forms in Word for Windows documents, but tables are embedded only as snapshots, not as live objects. Additionally, Access is mail-enabled, so you can send reports or tables to other users from within the application.

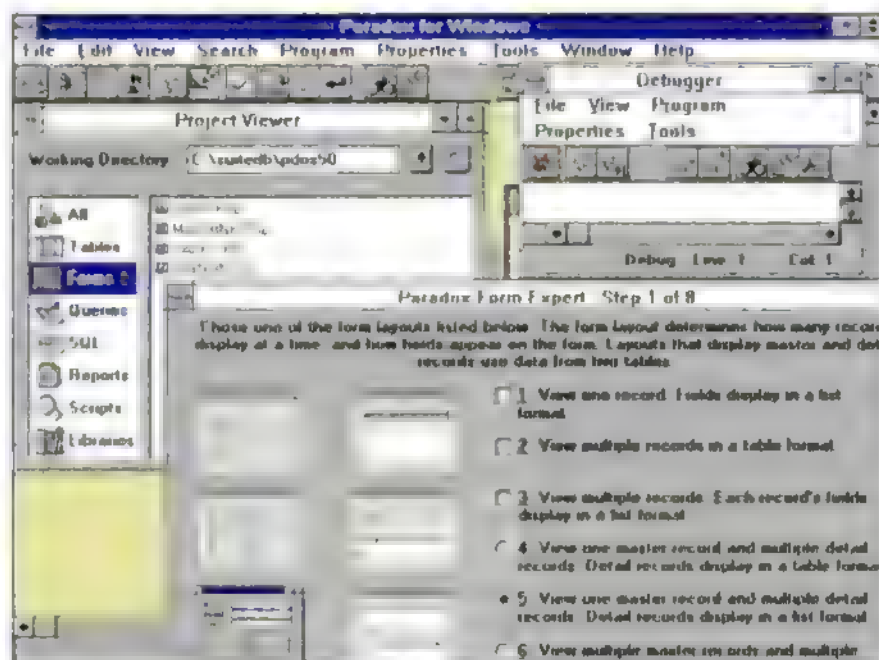
From the simplicity of Wizards to the robustness of Access Basic, Microsoft Access 2.0 is a tool that many users will find indispensable for the corporate desktop.

WordPerfect, The Novell Applications Group

• Paradox 5.0 for Windows, Workgroup Edition

Paradox 5.0 for Windows, Workgroup Edition, the latest version of Borland's ever-popular database package, builds on its previous strength—scalable power for developers. It also adds new enhancements designed to assist end users in getting to existing databases and creating new ones more quickly than ever. If you're looking for a database system that can grow with you, take a look at this powerful tool, which has become a good deal friendlier for end users and developers alike.

Major advances in this release center around new usability features that help end users quickly build forms and reports using Experts, which are the functional equivalents of Microsoft's Wizards. The Form Expert, for example, lets Paradox users quickly design data entry screens, including both master and detail forms. The



Paradox 5.0 adds Experts to automate form and report design. There's also a Project Window that keeps track of all the files in your database.

Report Expert lets users create reports automatically, and the Mail Label Expert automates the creation of mailing labels based on selections of Avery label styles.

WINDOW ON YOUR DATA

Paradox's Project Viewer window—a control center that lets you keep track of all the files related to your active database, including all queries, reports, and forms—is a much needed and very useful enhancement.

Paradox offers some important ad-

vances on the back end, too. For example, Version 5.0 makes seven new data types available for Paradox tables, including logical (yes/no) fields and counter fields, which automatically increment things like invoice or other identification numbers.

Paradox pioneered the technique of linking tables by means of an intuitive, visual interface, and the methodology remains essentially unchanged in Version 5.0. Just as in Access, you use the mouse to specify links by dragging connections between fields in graphical representations of your tables. You can save the resulting "data model" and reuse it for building queries, forms, and reports.

New support for the ODBC standard in Version 5.0 furthers Paradox's database connectivity, allowing you to link to a variety of SQL and non-SQL data sources. With ODBC access and the optional SQL Link add-on product, Paradox is ready to share any SQL database across the enterprise. Even in a local directory, working with Paradox or dBASE files, Paradox supports local SQL statements—to perform updates and delete records, for instance.

OBJECTIVITY

Like its Windows predecessors, Paradox embodies the object-oriented philosophy of all of the language products born at Borland. Every Paradox form and control is an object that can be treated programmatically as an object and manipulated with properties and methods in an event-driven environment. Paradox's powerful script language, ObjectPAL, can manipulate any and all user-interface objects and databases.

Despite the new emphasis on end user functionality in this release, it's hard to avoid running into ObjectPAL on the desktop. Paradox scripts and macros must be written in ObjectPAL, and even common tasks like customizing a menu and closing a form must be carried out using ObjectPAL statements.

The new Paradox offers some real improvements, however, to make working with ObjectPAL easier for newcomers and experienced users alike. First, it's possible now to get context-sensitive on-line help for all the ObjectPAL objects and methods. In previous versions, you had to scroll through the entire list of objects to find the one you wanted, but help now

There's



on the keyboard,

there's a



in the printer,

there's



in the A: drive,

there's an



on the front,

there's only one way to fix it good as new.

Whether it's a mouse or a mainframe, the parts you fix it with should be the same kind we made it with—high-quality, rigidly tested, warranted IBM parts.

We have a full range of parts for all IBM products, including older systems like PC/XTs™ and System/36s, and you

can get exchange prices on selected items.

What's more, IBM parts are always available, and so are we. You can call us toll free 24 hours a day, 7 days a week for orders or price quotes, and, yes, we'll be happy to accept your Visa, MasterCard or American Express.



IBM PARTS
For orders or price quotes call anytime:

1 800 388-7080

COMPAQ DESKPROS ARE HERE.



They're Pentium-powered, and going fast.

Compaq Deskpro XL 560

- PENTIUM® 60MHz (OTHER PROCESSORS AVAILABLE)
- 8MB RAM (UPGRADABLE TO 136MB)
- 545MB SCSI HARD DRIVE (OTHER DRIVES AVAILABLE)
- 1.5" 1.44MB DISKETTE DRIVE
- PCI LOCAL BUS, ENHANCED ARCHITECTURE
- QVISION® PCI LOCAL BUS WITH 2MB VRAM
- COMPAQ 1024 COLOR MONITOR
- ENHANCED AUDIO CAPABILITIES
- VOICECAST™ KEYBOARD WITH INTEGRATED HIGH FIDELITY SPEAKER & MICROPHONE
- INTEGRATED 47.9M PCI Ethernet & FAST SCSI 2 CONTROLLER
- PREINSTALLED MS-DOS® 6, MS WINDOWS® 3.1, & TABWORKS®
- 1 YEAR WARRANTY

Why work harder when you can work smarter? Both of these Compaq® Deskpros® take today's latest technology and optimize it to give you remarkable performance.

The Compaq Deskpro XL offers you crisp performance for even your most demanding tasks. Its PCI local bus technology further enhances perfor-

mance for fast data transfer, so that you can truly make the most of the Pentium processor. Or check out the Deskpro XE for budget-friendly performance that includes QVision Local Bus Graphics, and a wealth of innovative features.

So, how fast will they go? Well, they're Compaq Deskpros. So call now.



Compaq Deskpro XE 560

- PENTIUM 60MHz (OTHER PROCESSORS AVAILABLE)
- 8MB RAM (UPGRADABLE TO 136MB)
- 270MB HARD DRIVE (OTHER DRIVES AVAILABLE)
- 1.5" 1.44MB DISKETTE DRIVE
- QVISION LOCAL BUS GRAPHICS WITH 1MB VRAM
- COMPAQ SVGA COLOR MONITOR (1024 X 768)
- ENHANCED AUDIO CAPABILITIES
- FREE-STANDING MICROPHONE
- PREINSTALLED MS-DOS 6, MS WINDOWS 3.1, & TABWORKS
- COMPAQ 1024/PC ARCHITECTURE
- PLUG AND PLAY READY
- 1 YEAR WARRANTY

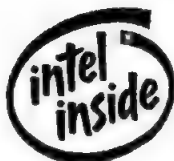
COMPAQ
DirectPlus



1-800-888-8298

Now Free Toll-Free In All States
Call Now To Order Or To Register
A DirectPlus Account

OR FOR THE NAME OF YOUR NEAREST COMPAQ AUTHORIZED DEALER, CALL 1-800-308-7774



Restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a One Year Warranty. © 1994 Compaq Computer Corporation. All rights reserved. Deskpro, Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. DirectPlus is a registered service mark of Compaq Computer Corporation. QVision is a trademark of Compaq Computer Corporation. Prices listed are for products purchased through Compaq DirectPlus. Dealer prices may vary. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks and Windows is a trademark of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. The Intel Logo is a registered trademark and Pentium is a trademark of Intel Corporation. Offer available in the U.S. only.

None of the products in this roundup proved to be a clear performance leader; each landed in first place on at least one of the four tests. Nor did any achieve the perfect marriage between speed and ease of use, although both Microsoft Access 2.0 and Lotus Approach for Windows 3.0 came close—each in its own way.

What the Numbers Mean

Although Lotus Approach for Windows garnered excellent scores on the Select and Report tests, it lagged significantly behind the other products on the Update and Sort tests—largely because it builds “Smart Indexes” on the fly for multitable operations. By forcing the building of these indexes, Approach tacks time onto the query process that the other applications do not, and subsequently the total process takes longer. Once these indexes are built, however, any operations performed on the found data set are performed significantly faster.

Microsoft Access was the most consistent performer of our three products. It scored first on the Select test only but was close to the leader on each of the other tests.

Paradox 5.0 for Windows, Workgroup Edition, did well on all the tests except for the Report test, on which it was a distant third. Compared with the showing of its previous version, even this result marked a substantial improvement, however.

How We Tested

We performed all tests on a Compaq Deskpro 486/33M equipped with a 340MB hard disk and 8MB of RAM running DOS 6.2 and Microsoft Windows 3.1.

We tested our database products using a subset of the AS³AP (ANSI SQL Standard Scalable and Portable) benchmark tests for relational database systems, originally developed at Cornell University by Dina Bitton.

We generated our test files using the AS³APGen program. We created two tables in unquoted, comma-delimited form; both tables had identical schema. The first table was designed to have unique values in every field, and the second was designed so as to return 10 percent of its records in response to our queries. We performed all tests using menu choices, rather than SQL commands.

TEST CATEGORIES

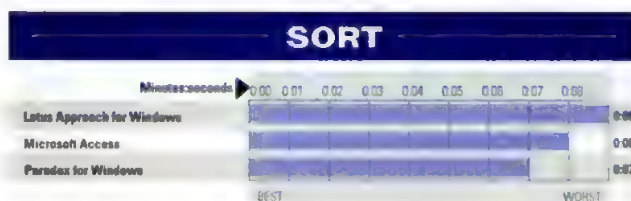
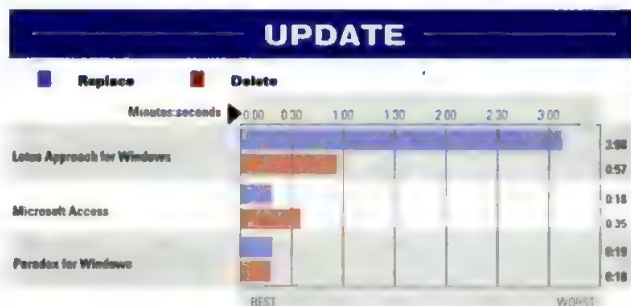
The **Select** test measures the time a product takes to retrieve a group of records from a single table based on specific selection criteria. It uses two queries based on two data-field types: integer and alphanumeric. The integer query (*query one*) is based on the key field of the unique value table; the alphanumeric query (*query two*) is based on a field in the 10 percent table

containing redundant data. In each case, the query is designed to return 10 percent of the total records.

The **Report** test measures how long each product takes to create a standard columnar report based on fields selected from two joined tables. The report involves several tasks: joining two tables based on a key value, sorting on one field (in ascending order), calculating totals and subtotals in two other fields, and displaying the results.

The **Update** test measures the time each product takes to select 1,000 records from a 10,000-record table (based on a field value) and perform an action. This is broken down into two components, one in which a field has its value replaced (*replace*) and another in which the field's contents are deleted (*delete*).

The **Sort** test measures the time a package needs to sort a table in descending order based on an unindexed numeric field.



takes you directly to the topic of your choice.

In this release, the product also contains new objects and methods that provide better access to SQL databases. Another appreciated improvement is the redesigned Methods window, which makes getting to attached code for controls and forms a good deal easier.

BANISHING BUGS

Paradox 5.0's real standout advance for developers is a completely new ObjectPAL debugger—complete with its own toolbar—which now resembles the debuggers in other Borland language products. You get full-fledged control of watches and breakpoints within a very easy-to-use debugging window. Many developers might agree that this advance alone makes the upgrade worthwhile. For users who have never attempted Paradox programming, these enhancements alone might well get them over the hump in mastering such ObjectPAL basics as calling up forms and customizing menus.

Through OBEX (Object Exchange), Paradox 5.0 comes workgroup-enabled right out of the box. Users can publish, subscribe, and send documents to any other user in their group. Paradox is also the first fully OLE 2.0-compliant database product on the market, so you can embed Paradox tables or reports in other OLE-supported documents.

Other improvements to Paradox 5.0 are more subtle and subjective. The product loads more quickly than previous versions and generally feels snappier. Borland has clearly worked on improving the speed of database access.

Power, shared access, and a continued commitment to keep Paradox users connected to the latest SQL and non-SQL databases all help make the new Paradox a welcome revision to an already capable tool. It has the feel of a mature product and closely approaches its professed goal of being a scalable product that works well on 1 desktop or 100. Paradox's generally acknowledged power has been further enhanced, but it has also been tempered—to the enormous advantage of users who might have been intimidated by the prickly surface of ObjectPAL before this release.



Suite Little Extras

BY TED STEVENSON

The big three application suites compete head-to-head primarily on the basis of their core applications—the word processors, spreadsheets, databases, and presentation-graphics packages. Each vendor tries to sweeten the pot, however, by adding programs that round out suite

functionality and attract buyers in search of that little something extra.

In the following capsule reviews, we take a look at the e-mail client packages included in Microsoft Office Professional and WordPerfect's PerfectOffice for Windows. We also look at the personal information managers that come with Lotus

■ Highly Presentable Graphics

By Don Labriola

It's no accident that today's presentation-graphics packages have some of the most polished user interfaces around. Because so many users run them only on special occasions—such as the night before a major presentation—high-powered interactive learning aids such as self-explanatory presentation templates and on-line minitutorials have now become de rigueur among the major players.

FREELANCE GRAPHICS FOR WINDOWS 2.1

Lotus' Freelance Graphics for Windows, Version 1.0, redefined this category, pioneering now-ubiquitous features like "Click Here to Enter Data" templates. More recently, the program has been matched by aggressive competitors that have incorporated most of its innovations and added more of their own. Although Freelance 2.1 (available in a beta version at press time) corrects enough of the earlier program's deficiencies to ensure continued status as a major player, it doesn't go quite far enough to overtake such advanced products as Microsoft PowerPoint and Software Publishing Corp.'s Harvard Graphics for Windows.

Nonetheless, Version 2.1 includes some intriguing new features, such as task-specific SmartMasters, which generate presentations tailored for particular themes. The Business Plan SmartMaster, for example, includes

slides that address pricing strategies, product positioning, and risk analysis. The package also adds long-overdue enhancements like balloon help, better Lotus Notes integration, and TrueType support.

The resulting product, however, is a mixed bag. It's relatively easy to use, runs fast enough to use on a 386, and is capable of producing eye-popping results, but it simply isn't as advanced as some of the competition.

For example, its usability features are good, but they can't match PowerPoint's even more impressive complement of interactive learning aids. Freelance lets you import multimedia objects via OLE 1.0, but it provides none of the animation or time-line-based synchronization capabilities of packages such as GoldDisk's Astound. Other features, like its charting module and customizable toolbars, are well designed but don't stand out among other programs' equally excellent implementations.

If Freelance was the only presentation package on the market, we could live with it happily; it's a very good product by any standards. At the moment, however, it's simply not the best.

MICROSOFT POWERPOINT 4.0

Earlier versions of Microsoft PowerPoint sold well on both PC and Macintosh platforms but often fell behind

SmartSuite for Windows and PerfectOffice. PerfectOffice is slated to include other extras, such as a portable document reader, but these were not ready at test time.

Microsoft Corp.

● Microsoft Mail for PC Networks

One of Microsoft Office's components is license and client software for Microsoft Mail. Few other packages make e-mail so easy and accessible to the newcomer. Mail's clean, straightforward interface is unimpeachable, and the package's animated tutori-

als and generous indexed help files remove the mystery from virtually all its features.

A toolbar and pull-down menu offer many features for addressing and managing messages—even changing passwords. You can choose from several methods of addressing messages, including accessing lists of your own devising. You can even send messages to a recipient's fax address. To forward messages, just drag and drop them into the out-box.

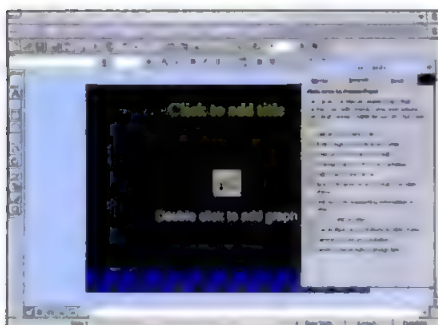
Mail offers only one font for message text, but it supports OLE, so you can insert documents, spreadsheets, charts, drawings, and bitmapped graphics into the message

text as objects, with their formatting intact. Mail's spell-checker can automatically check your message text any time you send mail, and it supports an unlimited number of attachments to any message. The program notifies you when you receive mail, and you can assign priorities—urgent, normal, or low—to the mail you send—*Amarendra Singh and Ted Stevenson*

WordPerfect, The Novell Applications Group

● GroupWise

The Windows client module of WordPerfect's GroupWise, the successor to Word-



Microsoft PowerPoint's Cue Cards provide running commentary that explains your options at every stage of the presentation-creation process.

other packages in terms of functionality and ease of use. Version 4.0 changes all that, adding a huge number of new features cherry-picked from the competition. The result is a product that is as powerful and easy to use as any presentation program on the market—despite its limited multimedia capabilities.

PowerPoint's Wizards, for example, are interactive templates that ask you a few simple questions and then automatically create a formatted slide or generate a complete set of slides tailored for specific tasks. The program also includes a robust assortment of on-line learning aids—such as floating Cue Cards, which tag along as you work through common procedures—as well as one of the best help facilities we've seen. Other features designed to help you lead presentations more effectively include a Rehearsal Mode, which automatically times your delivery, and hid-

den slides that appear in a screen show only if you need them.

PowerPoint also offers a variety of other impressive features—such as drag-and-drop WYSIWYG text editing, intelligent color schemes, and superior text-effects tools. It provides only basic multimedia capabilities, however. Like Freelance, it uses OLE to insert media objects into slides but has no time-line capabilities, doesn't let you apply transitions to individual objects, and—despite the “flying-bullets” feature—can't animate objects along an arbitrary path.

PowerPoint isn't perfect, but its outstanding usability features and learning aids, and its solid across-the-board functionality, make it our favorite among the three packages reviewed here.

WORDPERFECT PRESENTATIONS 2.0 FOR WINDOWS

Several years ago, WordPerfect Presentations 2.0 for Windows would have been a contender, but by today's standards, it's behind the times. Despite some advanced features, it's not as intuitive as Freelance or PowerPoint, and it's the slowest of the three, running sluggishly even on a 50-MHz 486. Version 3.0, due late this year (and the one that will appear in PerfectOffice 3.0 for Windows), promises to clear up some of these problems, but the program is unlikely to find itself leading the pack any time soon.

At first glance, Presentations looks as if it ought to be a winner. Version

2.0 includes features like floating palettes for line, color, and fill patterns, right-click pop-up menus, and a graphical browser that lets you scroll through clip-art libraries. In reality, however, these features aren't as impressive as they sound: The floating palettes simply duplicate functions on the standard tool bar, the right-click pop-ups provide only rudimentary functionality, and the browser is excruciatingly slow.

Worse, the package's interface doesn't support common usability features such as a status line, automatic start-up dialog, or balloon help, and the program is plagued by arbitrary constraints such as an inability to create multicolumn bulleted lists. Entering information such as titles and bulleted text is also a hassle: Rather than let you type directly onto a slide, the program makes you use the cumbersome Chart Editor or an outline view.

Presentations does have a few redeeming features, however. Although its standard full-color development environment is slow, the wireframe draft mode is quicker, and compiled runtime presentations are actually quite fast. The program includes a Twain scanner interface and also boasts exceptional graphics tools, including an excellent auto-trace utility that converts bitmaps into vector images. Unfortunately, none of these features can fully compensate for Presentations' other deficiencies in basic functionality and ease of use. □

He Grew Up With MTV. He
And, Unfortunately, He'll B



Gets 300 Cable Channels. e In Your Audience Today.

Introducing Z-NOTEFLEX, The Ultimate Multimedia Presenter.

Audience attention spans are short. And if they snooze, you lose.

So what you need is a way to make your presentations really worth watching. A way like the Z-NOTEFLEX system, from Zenith Data Systems.

With the Z-NOTEFLEX system, you get the capabilities of a multimedia workstation built around a powerful notebook computer that you can carry in your hand

Inside, its high-speed Intel 486 processor and fast local bus deliver sharp, colorful images and full-motion video certain to get attention. Particularly when the LCD display is detached and positioned in your viewers' direction.*

Of course, no multimedia-ready system would be complete without a CD-ROM drive.** And the built-in, 16-bit audio, microphone and stereo speakers make



Z-NOTEFLEX
up to
IntelDX4[®] 75MHz processor
16-bit business audio
active-matrix, 256-color
LCD display

FLEXSITE
LCD display stand

FLEXBAY
battery charging bay
floppy drive bay

FLEXDOCK
enhanced port replicator
two type-III PCMCIA slots
networking module

FLEXSHOW[™]
double-speed CD-ROM drive
amplified stereo speakers
two type-III PCMCIA slots
integrated power supply

the Z-NOTEFLEX system truly a sound investment.

The Z-NOTEFLEX is modular, too. Its processor, memory, drives and display are all user-upgradable. Optional FLEX modules and PCMCIA slots support a wide range of system enhancements, multimedia capabilities and peripheral solutions.

You simply order the features you want today, then add others later as the need arises.

No other notebook makes it so easy to connect—with co-workers, with customers, in the office, or out in the field. But that's what people are learning to expect from ZDS.



To see what you can expect from the Z-NOTEFLEX, call us. Your audience will thank you.

1-800-945-0673, Ext. 5117

ZENITH
DATA SYSTEMS 

Make The Connection[™]

ARGENTINA
BRAZIL
BULGARIA
CENTRAL AMERICA
CHILE
COLOMBIA
CZECH REPUBLIC
INDIA
ISRAEL
ITALY
MEXICO
NORWAY
PERU
POLAND
PORTUGAL
RUSSIA
SOUTH AFRICA
SPAIN
TAIWAN
THAILAND
TURKEY
VENEZUELA



Send your message
around the world and
celebrate its
return.

PC Magazine has Licensed Editions all over the world. By advertising with the most trusted name in computer publishing, you can open new markets and conquer the world. For information on these foreign editions, contact the Ziff-Davis Licensing Department: Tel: 212-503-5422 Fax: 212-503-5420



SOFTWARE

Suites

Perfect Office, is slated to be a component of WordPerfect's PerfectOffice 3.0 for Windows. Though we didn't test GroupWise, we did examine a prerelease version of the product. More than just an e-mail system, this package integrates a variety of personal and workgroup messaging types, including standard e-mail, fax, and paging. An optional module supplies voice messaging and voice-activated message-forwarding as well. GroupWise includes native support for VIM, MAPI, and MHS. WordPerfect Office supports these transports but does so through gateways.

The GroupWise client has a huge array of features, including rules and routing, a spell-checker and thesaurus, and a file manager. An integrated PIM and group scheduler provide calendars and task management, a notepad, and a phone memo pad. The Shelf provides a place analogous to the Windows Program Manager program group; here you can add your own icons.

The package's built-in file manager uses folders for organizing messages and all other aspects of your work. You can drag and drop messages, appointments, notifications, documents, and the like between folders.

GroupWise is in the vanguard of a new generation of messaging products that promise to go way beyond what users have traditionally expected from e-mail products.—*AS and TS*

Lotus Development Corp.

• Lotus Organizer

Lotus Organizer's interface looks—and often behaves—like the familiar paper appointment book that you tuck into your briefcase. The package lacks powerful automated information links, but it does provide basic scheduling and contact management—as well as to-do lists—without overwhelming you. And since it *can* send meeting invitations and responses and check for available time slots within others' schedules via cc:Mail, it's an easy entry into group scheduling.

Organizer stresses the paper metaphor, storing its information on replicas of notebook pages. To move through the program's six modules—address book, calendar, to-do list, notepad, project planner (complete with Gantt charts), and anniver-

sary reminder—you click on tabs and dog-eared pages. To-dos and projects appear on the calendar, making for a slick at-a-glance daily display. You can easily customize the entire notebook by altering the order of its sections or by adding new sections. Organizer also offers an auto-dialer, automatic rollover of pending tasks, and e-mail enabling.

Although you can manually link information in different parts of Organizer, the program lacks the automatic connections provided by more powerful PIMs. You also can't add new fields to the few available in the address book. Still, it's one PIM that's easy to use right out of the box.—*Gregg Keizer*

WordPerfect, The Novell Applications Group

• InfoCentral for Windows

This intriguing albeit sometimes hard-to-comprehend personal information manager applies outline metaphors to the tasks of tracking people, tasks, events, and documents. InfoCentral for Windows treats each piece of information as an object that can be linked to others by drag-and-drop. These connections let you create and maintain complex relationships between people, organizations, tasks, and events—even documents.

Robust navigational tools—and a file-folder method of organizing data—make it easy to view outlines, reorganize data, and customize screens. A calendar has daily, weekly, and yearly (but not monthly) views. There's also an auto-dialer, alarms, and multiple security levels. The program doesn't provide several standard PIM tools, though, such as recurring appointments or reusable search queries.

InfoCentral's ability to link documents to other objects is impressive, as is its ability to embed OLE 2.0 objects within outlines. The program can also send files as attachments via GroupWise or any VIM- or MAPI-compliant e-mail system.

But because InfoCentral approaches information management differently than most PIMs, its meager documentation is an Achilles' heel. Version 1.1, due to ship with PerfectOffice 3.0 for Windows, Professional Edition, will feature tighter integration with GroupWise and better organized, more abundant documentation.—*GK*



Suite Integration

INTRODUCTION AND REVIEWS BY MICHAEL J. MILLER

Having looked at the major component applications, we're left with the central question of how well these components come together into an integrated suite.

Probably the most basic way to integrate applications is to make their interfaces as consistent as possible. With interface consistency, once you've learned one of a suite's applications, to master the others, you need to learn only the unique features specific to each task. The vendors are making progress in the area of consistency—though each suite still contains at least one component that doesn't feel particularly integrated.

COMPOUNDING THE SOLUTION

Another important step towards integration is being able to intermingle the functions and data types of several applications; typically this is done in a compound document such as a business plan that might include text, numeric tables, charts, and perhaps even images. The most useful tool for creating compound documents in today's suites is OLE. Specific OLE 2.0 features that facilitate the building of compound documents are dragging and dropping elements from one application to another and in-place editing. Not surprisingly, Microsoft has taken the lead here, but WordPerfect seems to be catching up.

All of the suite vendors also offer some form of task-based integration: programs or help systems designed to walk you through the process of using the packages together. Examples include the templates in Microsoft's Office Assistant, WordPerfect's new QuickTasks, and the Smart Assistants, which Lotus uses to move data from 1-2-3 to Approach.

Since most people need to share information, we've checked to see how well the suites integrate with e-mail systems and workgroup products such as Lotus Notes and WordPerfect's GroupWise: So far, so-so. As many users want to create their own suite-based tools, we've also

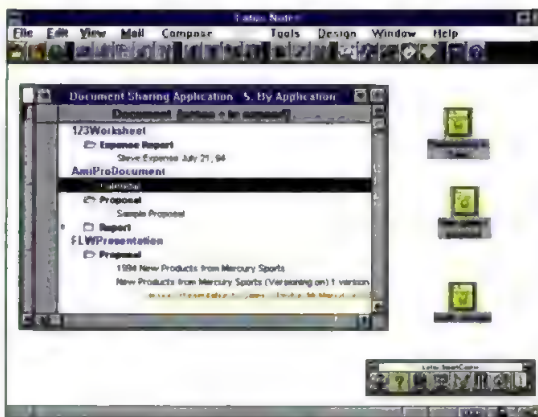
looked at cross-application macro languages, which are just starting to appear in earnest.

Thus far, no suite excels in all areas. Interfaces are becoming more consistent, and OLE is gaining a foothold. Workgroup and e-mail integration, however, are minimal, and cross-application macro languages are in their infancy. We've come a long way towards integration over the past two years, but we still have a ways to go.

Lotus Development Corp.

Lotus SmartSuite 3.0 for Windows

With Lotus SmartSuite 3.0 for Windows, Lotus Development Corp. aims at advancing integration on both the desktop and the workgroup fronts. This new release, which began shipping in August, offers a number of unique features for the standalone user, though it still lacks some basic integration tools. It breaks new



Integration with Lotus Notes lets you set up a document database of files created in Lotus SmartSuite's various applications.

ground in offering very tight integration with Lotus Notes, the company's workgroup standard.

Since Lotus SmartSuite 2.1 for Windows, Lotus has produced a completely new Lotus Approach for Windows and has substantially updated Lotus 1-2-3 for Windows with new mapping features and much

tighter integration with Approach. The word processor and presentation-graphics package sport minor changes, mostly aimed at improving Notes integration.

SMART LOOK

Lotus was among the first to make its applications share a consistent general look, with common SmartIcons and status bars on the bottom of the screens. It has enhanced this consistency in SmartSuite 3.0, most importantly by bringing Approach into closer conformity with the other major applications.

Another enhancement to SmartSuite's consistency is the integration of SmartMasters into more suite applications. Pioneered in Freelance Graphics as presentation templates, SmartMasters now extend to functions such as lists of suggested starting points for budget creation in 1-2-3, for example.

On the other hand, important elements of the suite, such as the File Open dialog box and the use of the right mouse button, could be more consistent.

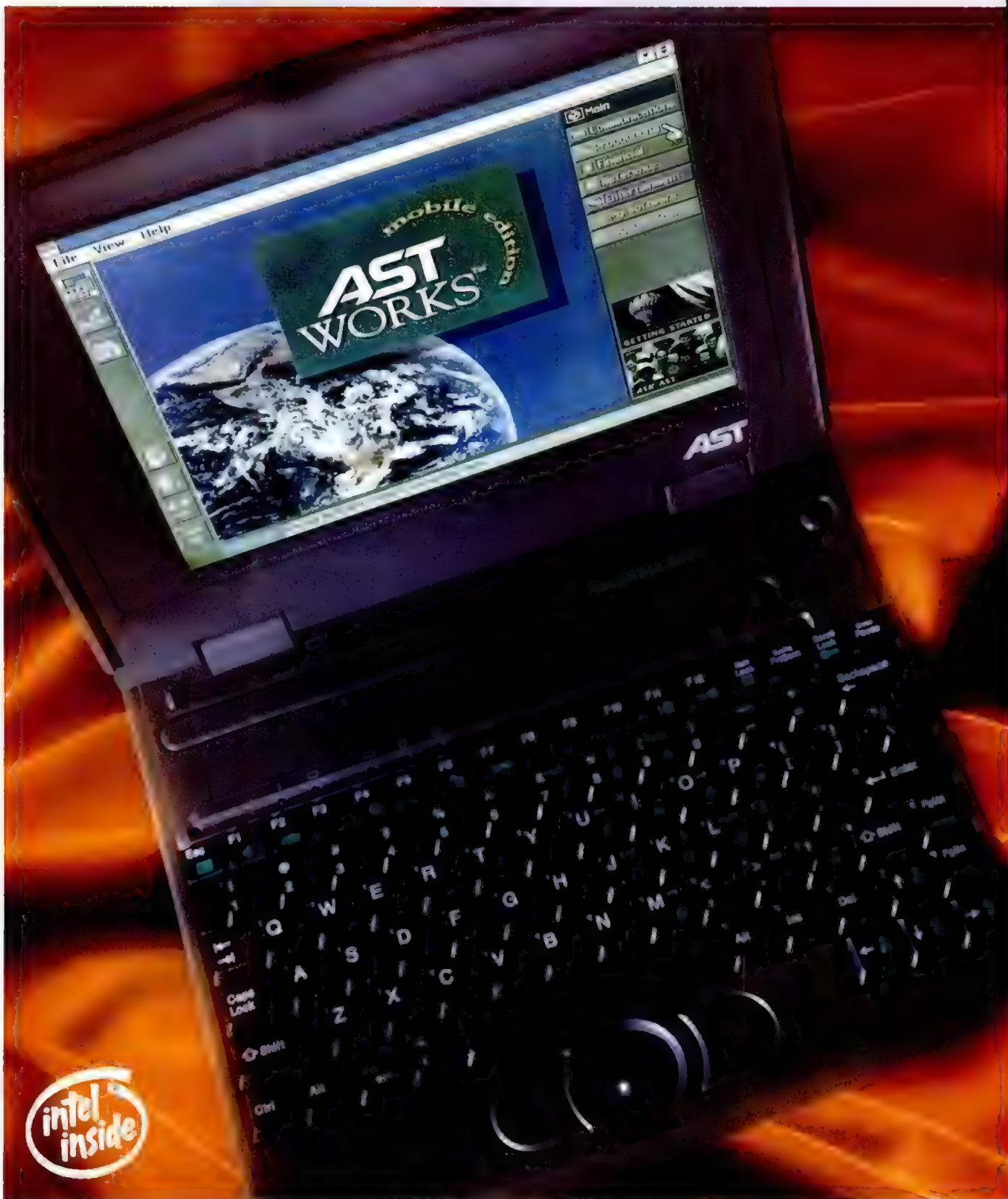
SMART FEEL

Several changes introduced with SmartSuite 3.0 bolster the integration of the product. First, it now has a common install routine that lets you opt for a complete installation or pick individual applications or even specific features.

Lotus catches up to the competition even further with SmartCenter, a floating icon palette that lets you load an application or switch to it if it's already running. SmartCenter comes set up for all the SmartSuite components, of course, but you can also easily add other applications. SmartCenter worked fairly well, though occasionally it would launch a second copy of an application instead of switching to an extant

session. In any case, it's a big improvement over SmartSuite 2.1's application manager.

From SmartCenter, you can also get to a number of useful tools that teach you about integration. The most unusual is ScreenCam, Lotus's multimedia capture and playback utility. You can launch sev-



THEY SAY VALUE IS GETTING WHAT YOU PAY FOR. WE SAY IT'S GETTING MORE.

If the nineties are about getting value for your dollar, then the Ascentia™ 800N is truly the notebook of the decade.

Because although it has a feature list putting it right up there in the high performance class, it also has a price tag that will have you wondering if it's attached to the right machine.

For starters, the 800N gives you Intel's powerful 486DX2/50MHz processor. Plus hardware accelerated local bus graphics.

Bottom line, you'll be amazed not only by what you can do, but by how fast you can do it. The 800N manipulates numbers faster, handles graphics faster, basically does whatever you want it to do, faster.

Then there's AST Works™-Mobile Edition. A unique interface that includes software tailored especially for the mobile professional makes you productive instantly. So it's easier to orga-

nize files and quicker to find your way around applications.

We've also given you not just one but two PCMCIA expansion slots. So you can add a data/fax modem to access E-mail and check on-line services, and there's still an extra slot to add an Ethernet, token ring or SCSI card.

Oh, and there's another useful feature you won't find on many notebooks: a removable floppy drive which can be replaced with a second battery pack to double battery life, giving you a total of up to six hours.

Not only that, but you get the added peace of mind of our three-year worldwide limited war-

ranty, 48-hour rapid repair service* and around-the-clock telephone support.

Call 800-876-4AST for more information about the Ascentia 800N. If you haven't already rushed out and bought one.



Out with the floppy and in with a second battery pack. Battery life is instantly doubled.

Ascentia 800N
Intel 486SX/33 MHz or
Intel DX2/50MHz processor
(3.3 volt)
9.5" diag. Dual-Scan
STN color display
VL bus hardware
graphics accelerator
250MB or 340MB
hard drive
4MB RAM standard,
expandable to 20MB
2 Type II or 1 Type III
PCMCIA slots
SmartPoint 19mm trackball
NiMH battery
8.8"(d) x 10.4"(w) x 1.7"(h),
5.9 lbs.
Pre-loaded with
AST Works-Mobile Edition

YOU'LL LIKE THE WAY WE WORK™

AST
COMPUTER

Shopping Around For A \$500 15" Flat Square Color Monitor? Check Us Out.

Required Features

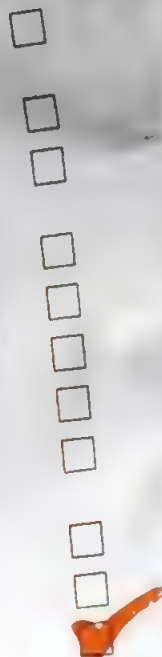
**New
Model**

High Refresh 1024 x 768
Non-Interlaced Resolution
Auto Calibration
Microprocessor-Based
Auto-Scanning
Color Calibration System
Digital User Controls
On-Screen User Controls
Compact, Lightweight Design
Dark Tinted, Optical Quality
Anti-Static, Anti-Glare Screen
Wide 100 MHz Video Bandwidth
Screen Safety Display
\$500 Street Price (Approximately)

Mitsubishi Diamond Pro® 15FS



Other Leading 15" Flat Square Model

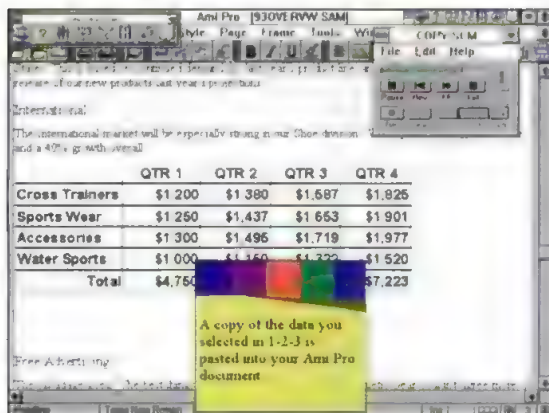


The standard of excellence in 15" (14" V) flat square color monitor design has just taken a quantum leap forward. Introducing the new Mitsubishi Diamond Pro 15FS. More monitor for your money.

For more information on the Diamond Pro 15FS, call us at 1-800-843-2515 in the U.S. and Mexico. In Canada call 1-800-387-9630.

For immediate product specifications, call Mitsubishi Quikfax at 1-800-937-2094.





The screenshot shows the Ami Pro application window with a menu bar (File, Edit, Help) and a toolbar. Below the menu bar is a text area with some text. Below that is a table with four columns labeled QTR 1, QTR 2, QTR 3, and QTR 4. The table contains data for Cross Trainers, Sports Wear, Accessories, and Water Sports. A yellow text box is overlaid on the table, stating: "A copy of the data you selected in 1-2-3 is pasted into your Ami Pro document".

	QTR 1	QTR 2	QTR 3	QTR 4
Cross Trainers	\$1,200	\$1,380	\$1,687	\$1,825
Sports Wear	\$1,250	\$1,437	\$1,653	\$1,901
Accessories	\$1,300	\$1,495	\$1,719	\$1,977
Water Sports	\$1,000	\$1,150	\$1,320	\$1,520
Total	\$4,750			\$7,223

The ScreenCam utility included with SmartSuite lets you play back prerecorded tutorial "movies"; you can even create your own.

eral ScreenCam movies from SmartCenter to show how specific tasks are performed. You can also create your own sequences for use as in-house training aids. In addition, SmartCenter gives you access to a SuiteAnswers menu of over 50 help cards showing how the individual applications work as part of the suite.

By and large, however, SmartSuite lacks the general integration tools you'll find in the other two suites. Of its major applications, only Approach can act as an OLE 2.0 client and can also support in-place editing. Lotus 1-2-3 does support OLE 2.0 drag-and-drop, however, and in a particularly innovative way: You can drag a range from 1-2-3 and drop it on the SmartCenter icon of another OLE 2.0-compliant application to launch or switch to that application. After this, you can drag and drop the data itself.

Lotus still has not released Lotus Script, its cross-application macro language. The company promises this in a future release, followed by more support for OLE 2.0 in the individual applications. With an eye to the long term, Lotus has recently joined Component Integration Laboratories and is looking at the OpenDoc object specification.

DIFFERENT DRUMMER

In place of general integration tools, Lotus has furnished task-based tools designed to help you use the applications together. A good example is the Smart Assistants (Lotus' equivalent of Wizards) that carry out interapplication tasks integrating the functions of 1-2-3 and Approach. From

the 1-2-3 menus, for example, you can choose Form, Report, Mailing Label, and Dynamic Crosstab options, each of which leads you to a Smart Assistant that actually calls Approach. It's perhaps the most impressive integration between any two major applications in any of the suites.

SmartSuite includes other hints and methods of making the applications work together, primarily through a set of macros that ship with Ami Pro's Bonus Pak. Although these were impressive when the features first shipped about a year ago, today

they look a bit dated. For instance, a SmartIcon in Ami Pro uses Freelance Graphics to curve text in your document, but it's strictly a one-shot, one-way function; there's no editing. The word processors in the other suites come with little applets for applying special effects to text.

On the other hand, by paying special attention to Notes, Lotus is taking a firm

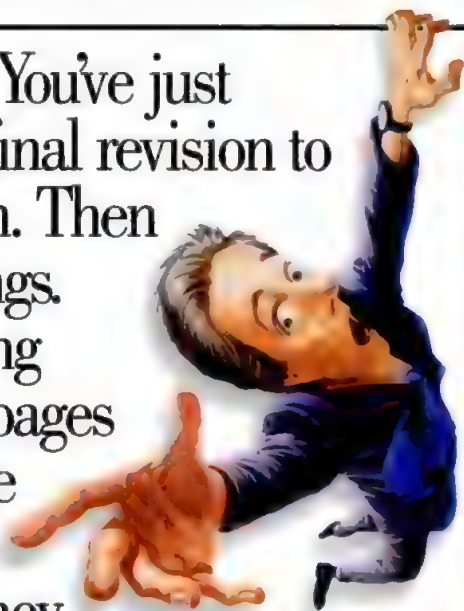
lead on the workgroup front. All of SmartSuite's major applications support Notes/FX, which makes data contained in application files accessible as fields in a Notes database. For example, you might have a Notes database of 1-2-3 spreadsheets in which Notes totals the results stored in a particular field of all the spreadsheets.

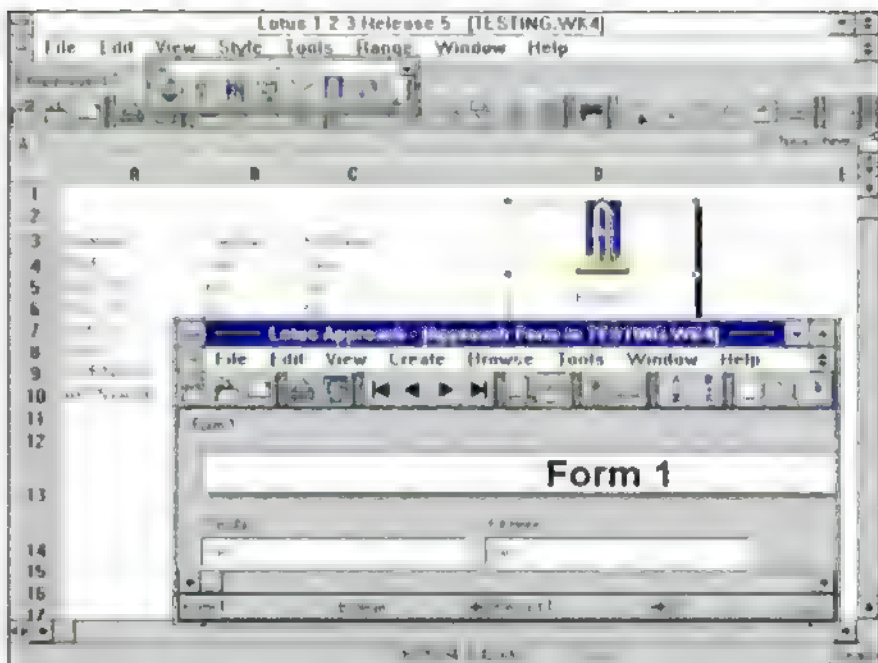
Notes/FX also lets you store documents in a Notes database while still using the individual applications to edit them. This would let you track Ami Pro or Freelance Graphics documents and with some programming could even provide features such as revision tracking. In fact, the sample database provided with Ami Pro does just that. Finally, Approach 3.0 lets you create forms to query Notes databases directly, a real advantage for Notes users.

MAIL CALL

As is now true for most applications, the SmartSuite applications are mail-enabled, with support for both VIM- and MAPI-compliant mail systems. Ami Pro now gives you plenty of options for creating

It's 3:50 pm. You've just finished the final revision to the sales plan. Then the phone rings. "We're sending over 10 new pages of competitive info." Click. Good thing they lock the windows on this floor. You have to get it into the plan by the end of the day. What now?





The Form Assistant lets you create an Approach form to enter data into a 1-2-3 database. The icon button calls up the form whenever it's needed.

mail memos, but it's not integrated enough with the mail packages to let you receive incoming mail or reply. Approach and 1-2-3 now have routing features, letting you move files sequentially to a number of users. Alas, Ami Pro lacks this feature.

SmartSuite is the least resource intensive of the suites, but it's still a large application. We think you'll want a minimum of 8MB of RAM, a 486 computer, and between 33MB and 86MB of hard disk space, depending on the option you choose. As a complete suite, SmartSuite 3.0 is still missing some tools we think are essential, some better ways of moving data among applications, and a common macro language. Still, the integration among the applications has improved dramatically, and integration with Notes is a unique strength.

Microsoft Corp.

• Microsoft Office Professional 4.3

In the fall of 1993, Microsoft Corp. raised the level of competition in the suites market with the release of Microsoft Office, Version 4.0, which promised a new degree of consistency among its applications. While Microsoft Office 4.0 nominally contained Microsoft Word for Windows 6.0, Microsoft Excel 5.0, and Microsoft PowerPoint 4.0, the latter two applications didn't ship with early copies of the suite. Rather, customers got the older versions of Excel and PowerPoint plus coupons for free upgrades to the new versions. Microsoft subsequently delivered

the upgraded applications.

Microsoft Office Standard, Version 4.2, which included Word for Windows 6.0, Excel 5.0, PowerPoint 4.0, and a client license for Microsoft Mail, started shipping in March and was followed by Microsoft Office Professional, Version 4.3, which adds the Microsoft Access 2.0 database. Both editions are available on either floppy disks or CD-ROM; the CD-ROM version includes Office Assistant, a collection of templates that is also available in a standalone package.

STANDARDIZED

Particularly in the Standard edition, Microsoft has done a good job of making the programs work consistently. The major menus, icons, and even functions such as AutoFormat remain relatively constant throughout the applications. Access 2.0 has moved much closer to the feel of the other applications, though it's still not quite as well integrated.

Microsoft Project, on the other hand, is not part of Microsoft Office, yet it looks and feels very similar to the mainstream Microsoft Office applications. In fact, Microsoft has moved fairly aggressively to get independent software vendors to make products that are Microsoft Office-compatible and share a similar look. Examples include Shapeware's Visio Express and MacroMedia's Action!

Microsoft has made extensive use of OLE 2.0 as a method to integrate its applications. All of the standard applications can function as OLE clients or servers, support drag-and-drop, and be controlled via OLE automation. This results in some useful integration. For example, you can create an Excel spreadsheet directly from an icon in Word for Windows and have that spreadsheet look and act like part of your document. When you double-click on the spreadsheet, you get Excel's menus, toolbars, and functions, while the spreadsheet still looks like part of the document. Such in-place editing

is quite slick, though it does take some getting used to.

In-place editing is not without its problems. For one thing, it requires considerable system resources, since you are in effect loading another application. As a result, this feature can be very slow on systems with less than 8MB of memory.

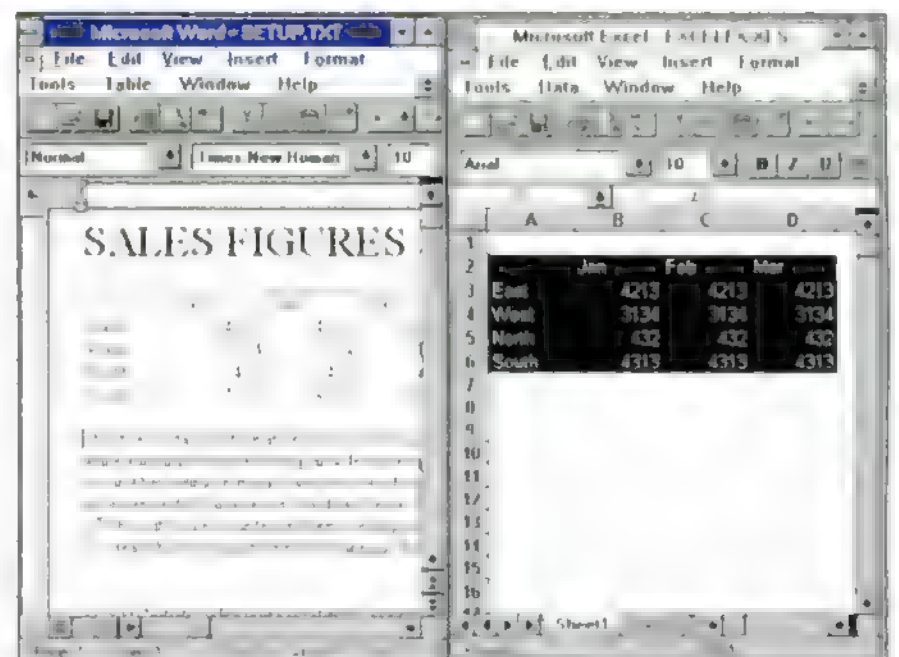
In addition, sometimes in-place editing only points out ways in which the ap-

In-place editing is not without its problems. It requires considerable system resources, since you are in effect loading another application.

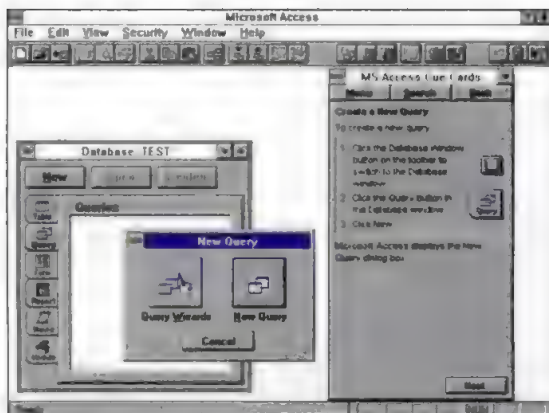
plications ought to work better together. For instance, PowerPoint no longer includes its own table tools; instead, it uses the tools in Word for Windows or Excel. This works nicely except that PowerPoint gets confused about color palettes, leaving you with tables that can be hard to read.

MOM (BUT NO APPLE PIE)

To launch applications and switch between them, you use the icon bar dubbed Microsoft Office Manager (MOM). With Version 4.2, MOM has improved; you can now add any other application to the toolbar and use the application's own icon file. You



OLE 2.0's drag-and-drop editing feature lets you drag an Excel spreadsheet range into a Word for Windows document.



Cue Cards take you through setting up an Access query step by step; the Query Wizard further automates the process.

can also easily control the size and order of the icons as well as the order of the applications by using a pull-down menu. By default, MOM sits on the top of the screen, but you can turn it into a floating palette.

The current version of MOM includes a small file-finder application that includes preview capabilities for all of Microsoft's applications. It lacks the file viewers and indexing capabilities of WordPerfect's QuickFinder, however.

MOM also includes Cue Cards advising you of the most common ways to share information—placing Excel worksheets or charts in Word for Windows or PowerPoint, for example, or using Access tables in mail merges with Word for Windows. MOM also provides conventional help files for moving information into Word for Windows, Excel, Access, and PowerPoint.

Office Assistant, which is offered as an independent add-on to the disk version but is included in the CD-ROM versions of Microsoft Office Professional, contains a number of templates designed for running a business. These include cross-application templates for such items as a business plan (including spreadsheets and charts), newsletters, forms, and reports. In addition, it includes 33 PowerPoint templates designed for business users plus 35 TrueType fonts and a Font Assistant for organizing them.

LANGUAGE BARRIER

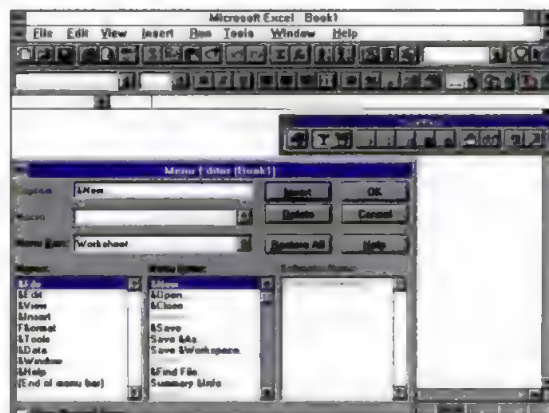
Microsoft has talked for years about the need for a cross-application macro language and has positioned its Visual Basic,

Applications Edition, as the first major implementation under Windows. While that's generally true, a cross-application language that ships with only one application in the suite (Excel) seems a contradiction in terms. In any case, you can use Excel's VBA to control Word for Windows, Access, and other applications that support OLE automation.

On the workgroup side, Microsoft includes a user license and client software for Mail. Word for Windows, Excel, and PowerPoint are all mail-enabled (for either MAPI or VIM), so you can send documents directly from them either as a broadcast or sequentially.

The latest Microsoft Office update, Version 4.2c of the Standard edition (and an equiv-

alent release of the Professional edition) includes some minor bug fixes to various applications—plus enhanced Lotus Notes support. This lets you work with Notes data in Word for Windows, Excel, and PowerPoint and store files in Notes databases. Then, using Notes/FX, you can total up the results of fields or use Notes to share documents. Microsoft promises to post a number of Notes templates on



Excel's Visual Basic, Applications Edition, is the first implementation of Microsoft's complete cross-application macro language.

You think she's finishing the proposal. She thinks you are. Surprise, neither one of you are. And it's 4 hours before the grant committee meets. Let's see, 16 new pages of data, 11 article reviews, 3,600 words sent by your partners in Istanbul. Who can type faster? Aaargh! What now?



CompuServe.

Microsoft Office takes between 21MB and 68MB of hard disk space for the Standard edition and 43MB to 82MB for the Professional edition. Microsoft also plans an update to the CD-ROM version of Microsoft Office Professional, adding its Bookshelf reference product.

Microsoft Office is the mark at which other suite vendors are aiming. It was the first major suite to aim at integrating rather than just bundling applications, and it provides a good basic level of interface consistency. We could ask for OLE integration to be faster and easier, for the cross-application macro language to be implemented in more components, and for more task-oriented integration tools like the ones in Office Assistant. But for now, Office sets the standard, and we look forward to seeing it advance in the future.

WordPerfect, The Novell Applications Group

• PerfectOffice 3.0 for Windows (prerelease)

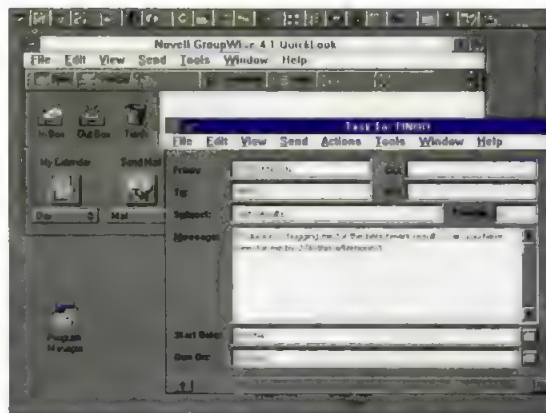
No suite has had more ground to cover than PerfectOffice 3.0 for Windows, the new product under development by WordPerfect. When we last reviewed suites in our issue of February 8, 1994, Borland International was selling the combination of WordPerfect 6.0a for Windows; Quattro Pro 5.0 for Windows, Workgroup Edition; and Paradox 4.5 for Windows, Workgroup Edition, as Borland Office for Windows, Version 2.0. Since then, both Borland's Quattro Pro spreadsheet and WordPerfect Corp. have been acquired by Novell. Novell's Word-

Perfect division will be marketing the suite and is now working on a major revision, PerfectOffice 3.0 for Windows, which it plans to ship this fall.

PerfectOffice will come in three different configurations. The standard version will include WordPerfect 6.1 for Windows; Quattro Pro 6.0 for Windows, Workgroup Edition; and WordPerfect Presentations 3.0 for Windows, as well as InfoCentral 1.1 for Windows, Envoy 1.0a for Windows, and GroupWise 4.1a for Windows. (GroupWise is a new version of the old WordPerfect Office and includes e-mail and group-scheduling features.) PerfectOffice for Windows, Professional Edition, adds Paradox 5.0 for Windows, Workgroup Edition, and Novell's Visual AppBuilder 1.0 for Windows for creating custom applications. PerfectOffice Select will be a CD-ROM version that lets customers select components from the standard or professional version, third-party applications, and other WordPerfect applications signed onto WordPerfect's PerfectFit program.

JOINING FORCES

One of the clear improvements in PerfectOffice 3.0 is a more consistent look and feel among the major components. The major applications—including Quattro Pro, Presentations, and WordPerfect—now share a toolbar with many common (and consistently placed) icons. They also share a "powerbar," with information such as type style and size. Although technically this is the same combination of highly customizable user-interface elements that we saw in early versions of WordPerfect, the new look seems much more streamlined. Envoy and InfoCentral share some of the icons and much of the look, while



GroupWise, PerfectOffice's e-mail program, provides personal and group calendaring, scheduling, and information functions.

GroupWise, Paradox, and Visual App Builder have different looks—at least in the prerelease version.

All of the components in the standard bundle now share the File Open dialog box introduced in WordPerfect. This dia-

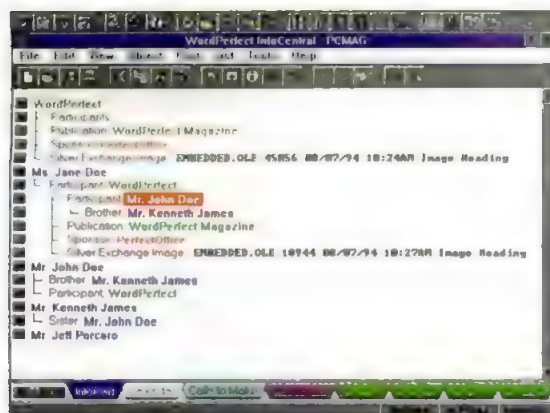
log includes such features as file viewers and offers the ability to group files. (In the prerelease version, you can view most word processing, spreadsheet, and database files, including Paradox files, but the version does not support InfoCentral or Envoy files.) The three products actual-

ly developed by the old WordPerfect Corp. (GroupWise, Presentations, and WordPerfect) share an even greater number of tools, including QuickCorrect (for fixing spelling errors) and QuickFormat.

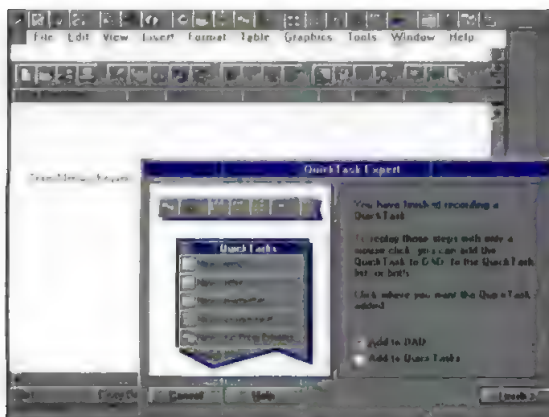
WordPerfect says that with this release all five of its suite applications will support OLE 2.0. The word processor, spreadsheet, database, and graphics programs will act as both OLE clients and OLE servers, supporting in-place editing and cross-application drag-and-drop. InfoCentral will be a client only. Paradox, incidentally, is the first database to act as an OLE server.

FAMILY MATTERS

To compete with Microsoft Office Manager (MOM), PerfectOffice includes the Desktop Applications Director (DAD).



PerfectOffice's PIM, InfoCentral, stores names, appointments, and tasks as objects that can be linked, as shown in this outline format.



The QuickTask Expert automates the creation of macros—in this case, a recurring memo—which can be stored as icons on DAD.

DAD has several nice, unusual features. You can move DAD wherever you want on-screen; if your applications are maximized, they'll resize around it. As a result, DAD won't cover up elements of your applications—unlike the application launchers in the other two suites.

DAD provides an icon that takes you directly to WordPerfect's file manager. This capability lets you group files together into a QuickList, as well as into index files and their contents.

DAD's most important addition, however, is QuickTasks—packaged macros that take you through the major elements of such tasks as creating a document or spreadsheet and conducting a mail-merge. QuickTasks are created in PerfectScript, the suite's new cross-application macro language that should let you record and customize macros (even QuickTasks themselves) to your heart's content. At the time of this writing, PerfectScript and QuickTasks were too unfinished to evaluate accurately.

PerfectOffice Professional's Visual AppBuilder is a nonintegrated cross-application language that Novell has positioned as the creation tool for AppWare. PerfectOffice Professional includes AppWare Loadable Modules for all of its major components, and through Visual AppBuilder (which is clearly a tool for professional developers), you'll presumably be able to link these together to create customized applications.

Although WordPerfect contends that Visual AppBuilder's main function is to control and drive the applications, we feel

that it seems aimed more at passing data between component applications. In the long run, it would be nice to see something that closely integrated PerfectScript, Visual App Builder, and Paradox's application-development features.

WE'RE ALL CONNECTED

PerfectOffice is clearly being positioned as a workgroup tool. As noted, it includes GroupWise, which has e-mail, scheduling, and calendaring features. In addition, the individual applications support other VIM and MAPI engines for sending files.

WordPerfect also considers Envoy a workgroup product, since it lets you publish documents that anyone in the workgroup can view. Furthermore, WordPerfect says the package will support Novell's NetWare Navigator for network installation and various other network administration features. This release does not share information with Novell Directory Services.

CREATE YOUR OWN SUITE

PerfectOffice Select (the CD-ROM version) is being designed to let customers create their own suites out of a combination of PerfectOffice components and third-party products designed to complement them, such as specific dictionaries. WordPerfect also says this version will include linking technology so that features such as QuickTasks will work if you use, say, a different spreadsheet. Unfortunately, none of this was available for testing.

PerfectOffice's predecessor, Borland Office, was probably the least integrated of the three major suites, but with PerfectOffice, WordPerfect has made decidedly substantial progress. In areas such as cross-application macro languages, OLE support, and CD-ROM packaging, PerfectOffice is staking out brand-new ground. At this point, it's a bit too early to tell whether or not the final product will live up to its early promise, but stay tuned: PerfectOffice may well change what we expect from suites. □

Get OmniPage OCR software now.

It's easy to install and use. It's fast.

And it enables you to scan in new information with no retyping. It's simply the best text recognition

software. Try the OmniPage family for yourself at an authorized Caere dealer today. Or call 800-535-SCAN. OmniPage from Caere. The recognized leader in OCR software.



omniPAGE



Caere, the Caere logo and OmniPage are registered trademarks of Caere Corporation. © 1994 Caere Corporation

CIRCLE 292 ON READER SERVICE CARD

Powerful, but personal.



Intergraph's PERSONAL WORKSTATIONS

Finally. A single system combining workstation power with PC personality — the personal workstation from Intergraph

- Performance and power of a workstation
- Personality, compatibility, and affordability of a PC
- Productivity tools integrated with advanced technical applications
- Popular, easy-to-use Microsoft Windows operating environment
- Professional display technology and the industry's broadest monitor selection
- Packaged, ready-to-run systems with built-in networking and graphics
- Path for growth as your computing needs expand
- Perfectly designed for a safe and comfortable work environment

Powerful, but personal. A family of personal workstations from Intergraph.

- Single or dual 90 MHz Intel Pentium processors
- Windows NT or Windows/DOS operating system
- 512 KB external cache
- High-performance 3D graphics accelerators
- 16 to 256 MB internal memory
- Choice of single and dual 17-, 20-, 21-, and 27-inch color display systems with up to 16.7 million colors
- 540 MB, 1 GB, or 2 GB Fast SCSI-2 disk
- Integrated Ethernet
- 3.5-inch, 1.44 MB floppy disk drive
- CD-ROM
- EPA Energy Star compliance
- 3 year limited warranty
- Worldwide sales, service, and support



For more information
or the number of a sales
representative or
business partner near you,
call 800-345-4856.

INTERGRAPH
COMPUTER SYSTEMS

CIRCLE 048 ON READER SERVICE CARD

Intergraph and the Intergraph logo are registered trademarks of Intergraph Corporation. The Intel Inside and Pentium Processor logos are trademarks of Intel Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corporation. Other brands and product names are trademarks of their respective owners. Copyright 1994 Intergraph Corporation, Huntsville, AL 35894-0001 D0AD19080

2-D CAD SOFTWARE

The world of 2-D CAD is changing. No longer must you sacrifice power for a pretty interface.

CAD's New Face

By Joel N. Orr

If you produce technical drawings, you'll do it faster and less expensively with CAD than without. But what's surprising is that \$3,700 programs compete with \$150 programs in this market, and the expensive ones outsell the cheap ones by a large margin. With such great disparity in price but not necessarily in performance, you need guidance in determining the combination of price and features that equals the right CAD package for you. In this evaluation, we focus on the differences among today's CAD contenders and identify these packages' strengths and weaknesses.

We tested the leading 2-D CAD products—Anvil-1000MD for Windows 2.00, AutoCAD 12 for Windows, Cadvance for Windows 6, DesignCAD 2D for Windows 7.0, Drafix CAD Professional for Windows 3.0, Drawbase for Windows Model 4000 1.2, DynaDesigner for Windows, MicroGDS 3.2, MicroStation PC 5 and MicroStation 5 for Windows NT, Pj2 CAD System 3.1, TrueCAD for Windows 2.10c, TurboCAD for Windows 2.01, Ultimate CAD for Windows Base



IN THIS REVIEW

<i>Anvil-1000MD for Windows</i>	223	<i>MicroGDS</i>	249
<i>AutoCAD for Windows</i>	227	<i>MicroStation for Windows NT</i>	252
<i>Cadvance for Windows</i>	232	<i>MicroStation PC</i>	252
<i>DesignCAD 2D for Windows</i>	234	<i>Pj2 CAD System</i>	254
<i>Drafix CAD Professional</i>		<i>TrueCAD for Windows</i>	255
for Windows	236	<i>TurboCAD for Windows</i>	259
<i>Drawbase for Windows</i>		<i>Ultimate CAD</i>	
Model 4000	237	for Windows Base.....	261
<i>DynaDesigner for Windows</i>	246	<i>Vellum</i>	263

2.1, and Vellum 2.12—and had CAD professionals put them through their paces. To be included in our roundup, the products had to be able to run as native applications on Microsoft Windows, Windows NT, or IBM's OS/2. In addition, they all had to support .DXF file import and export and include a macro language.



TOO PRETTY FOR CAD?

What's new in 2-D CAD? GUIs, for one thing. AutoCAD is finally a true Windows app, and a host of other CAD vendors have either ported or rewritten their applications for Windows. The degree to which each product complies with Windows standards varies greatly, though.

Many CAD users have avoided Windows because DOS versions of CAD programs have always been so much faster, and if CAD is all you do, that speed is very important. But for business professionals for whom CAD is only one of many activities they undertake each day, Windows offers clear benefits, in spite of the performance penalty it inflicts. In fact, the speed differences between Windows and DOS versions have shrunk considerably: For AutoCAD and most other products, the difference is as little as 10 to 20 percent. This is partly attributable to faster hardware in general and to the fact that CAD programmers often write around the Windows graphic device interface (GDI).

Extensible:

- **AutoCAD Release 12 for Windows**

Affordable:

- **DesignCAD 2D for Windows, Version 7.0**

There were a surprising number of subtle and not-so-subtle differences among the 15 CAD programs we evaluated. The perennial favorite, Autodesk's

AutoCAD—now in Release 12 for Windows—faced serious competition from a number of similarly priced programs and even from a few programs that cost thousands of dollars less. Nevertheless, AutoCAD's first real Windows interface, smooth and powerful operation in both mechanical and architectural tasks, excellent cross-platform support, and overall speed made it a winner once again.

(From a programmer's viewpoint, Windows is still not very CAD-friendly.)

DRAWING EXPERIENCE

Every category of technical drawing—mechanical, architectural, electric, electronic—places different demands on a CAD product. Most buyers use the packages in this evaluation for mechanical and architectural drawings. And yet, the big

Honorable mention goes to MicroStation for Windows NT, Version 5. This technically adept product is the obvious choice for any organization ready to make a commitment to Windows NT. MicroStation is available in a Windows 3.1 version, which suffered a bit in our testing because the 32-bit NT code can't run native under Windows code. In fact, both MicroStation programs stumbled on our Radial

sellers are the generic drafting packages. You customize the package to the needs of your application by adding symbol libraries and add-on software, generally from third-party vendors.

AutoCAD continues to dominate this market, with over one million installations that represent over 70 percent of the market. Most of those users do 2-D drafting only, although 3-D use is growing.

HIGHLIGHTS

2-D CAD Software

THE MOVE TO GUI has greatly altered the CAD landscape. DOS- and Unix-based packages still thrive, but the Windows and OS/2 environments bring new options to life. Look not only for essential GUI features, such as toolbars and Clipboard support, but also for extras, such as DDE and OLE. A couple of GUI rewrites manage only to have a rather awkward interface, and some are still command-line driven. Yet such limitations are occasionally offset by speedy performance.

THE GREAT DIVIDE still exists between

\$3,000 packages and their \$300 brethren, but several high-end features, such as workgroup support and myriad third-party add-ons, are making their way into the less expensive packages. Your decision rests on whether you work alone or need to share data with others and on what add-on tools you need to do your work.

WORKGROUP SUPPORT is a necessity for some users. If a package offers workgroup support, determine the levels of networking security—look for a file-locking mechanism—and the

method a package uses to extract data from files. Sophisticated workgroup and data-sharing capabilities are the secret of many an organization's success.

YOUR AREA OF EXPERTISE will directly affect which package you buy. For example, TurboCAD is strong in mechanical drafting. Drawbase 4000 includes solid database support, and the MicroStation packages handle both mechanical and architectural projects well. Our reviewed packages boast a wide variety of strengths.

Copy and Rotate tests. Just the same, Autodesk should take note: MicroStation was extremely close to AutoCAD in our evaluation and is definitely the CAD product to watch in 1995.

Since not every CAD professional is prepared to invest nearly \$4,000, much more affordable solutions abound. The good news is that with the exception of add-on libraries and overall extensibility, our affordable Editors' Choice pick, DesignCAD 2D for Windows, Version 7.0, can almost match AutoCAD's *native* functionality point-for-point. In addition to providing a powerful programming language that can be used to create your own add-on utilities, DesignCAD also delivers relatively fast and reliable performance. As is the case with a number of other products in this category, though,

its help system could still use some work.

Honorable mention in the more-affordable-though-less-extensible category goes to Drafix CAD Professional for Windows, Version 3.0. It features one of the best Windows interfaces we saw and even adds a 5,000-symbol library on CD-ROM. Unfortunately, its .DXF file importer is not quite up to par, and the program has no tutorials whatsoever.

A word of caution: Before you run out and buy any of these packages, spend some time thinking about your needs. Maybe you want more tools for facilities management, better symbol libraries and data management for architectural drawings, or better and wider network support. Read our evaluations carefully; you'll find that many of the programs we looked at have strong individual talents.

AutoCAD is one of the most expensive PC CAD packages you can buy, with a list price of \$3,750 (the street price is around \$2,200). And few serious AutoCAD users use it "barefoot"; more than 50 percent of AutoCAD users buy add-on software for additional hundreds or thousands of dollars. On the other end of the price scale, there are products for as little as \$150 that produce engineering drawings, have their own programming language, and read and write .DXF files. Why do some people buy a \$3,700 program when they could opt for an inexpensive package with similar functionality?

Part of the answer lies in training; there are, for example, hundreds of thousands of trained AutoCAD users. Another part of the answer is in the third-party applications available for certain high-end packages. There are many such applications for AutoCAD and, to a far smaller extent, MicroStation.

Network and workgroup support are for now the province of the more expensive packages; the inexpensive ones are designed for nonnetworked users—clearly an endangered species. For example, having grown up in the world of high-end CAD, MicroStation has been network-aware and functional for some time. But DesignCAD 2D isn't. Its makers see it po-

sitioned for individual practitioners for whom networking isn't an issue.

OTHER SOLUTIONS

What if you're simply not comfortable with the word *CAD* yet you need to create drawings with some intelligence behind them? Well, it turns out that there are more than a few alternatives out there for you.

There has been a convergence between CAD programs and what are generally known as illustration programs, such as Deneba Software's \$399 Canvas 3.5 and the \$695 Micrografx Designer 4.1 Technical Edition. The former have added fancier curve styles, color control, and integration of bitmaps and have refined typographics, while the latter are beginning to sport flexible dimensioning, symbol libraries, and data-extraction features.

Meanwhile, another category of drawing product has barged into this territory: the parametric template-based program typified by Shapeware's \$199 Visio and the

\$89.99 Aldus IntelliDraw. These products have "intelligent" entities, objects that "know" what actions can be performed upon them and how they can combine with other objects. The architectural refinement of this genre is represented by 3D Home Architect (\$60, from Broderbund) and its professional sibling, Chief Architect (\$595, from Advanced Relational Technology).

It is doubtful that any of these products would satisfy the CAD professional, however. So what if you've decided that it is in fact CAD that you want and you're still wondering if you should shell out \$150 or nearly \$4,000? If you work alone and your drawings are straightforward, any one of the lower-cost, less-extensible packages may suit you. But for users in larger departments who need workgroup functions and customization, \$4,000 may not seem so great a price to pay, especially when you factor in the cost of setting up a networked CAD system, recruiting trained operators, finding third-party add-ons, and having the assurance of compatibility with important customers or vendors.

Interactive Design Consultants

• Anvil-1000MD

BY WILL SCHLETER

Anvil-1000MD for Windows, Version 2.00, from Interactive Design Consultants manages to be a powerful and functionally complete CAD system, despite the fact that its interface only nominally qualifies as a Windows front-end. The \$2,595 Anvil-1000MD (the DOS version is \$100 less) provides many built-in features for 2-D mechanical design challenges.

Anvil-1000MD for Windows is simply an extension of the DOS-based version and does not use standard Windows features such as pull-down menus, dialog boxes, or toolbars. Its menu, graphics area, lists, and macro buttons are in separate windows, retaining the same interface used in the DOS- and Unix-based versions. Another non-Windows feature:

Our Contributors: JOEL N. ORR is president of Orr Associates International, a consulting firm based in Chesapeake, Virginia. He is also author of a regular column, "Windows CADD", in *Windows Sources* magazine. ALAN D. SMITH is a CAD industry analyst with 19 years of design and engineering experience. BRYAN M. WINTER is an architectural designer based in New York City. WILL SCHLETER and ROD TAYLOR are mechanical engineers based in Knoxville, Tennessee. LANCE ULANOFF was the associate editor in charge of this story, and JEFF MACE was the project leader.

GRAPHICS

2-D CAD Software

Anvil-1000MD accesses printers and plotters directly, bypassing the Windows drivers and limiting you only to those output devices supported by the program. The lack of support for the Windows Clipboard, DDE, and OLE simply reinforces the feeling that Anvil-1000MD is still out of place in the Windows environment.

MOVING THROUGH ANVIL

You navigate through Anvil-1000MD's hierarchical menu structure via keyboard numbers or by picking the menu items with the cursor. Mnemonic hotkeys and the customizable macro window (which can have over 140 buttons) provide shortcuts to often-used functions. The macro window is configured exactly as a graphics tablet overlay, but the program doesn't actually support the use of such an overlay (although the DOS version does).

Anvil-1000MD provides short, meaningful prompts for every step along the

way. A one-line hint for every interaction, awkwardly placed in the title bar of the graphics window, is the only on-line help available. There is unlimited undo/redo capability, dubbed the Chronicle, and the well-organized users' manual contains a short set of lessons and a reference section.

Aside from some cross-hatching difficulties, our test drawing of the gear was no problem for Anvil-1000MD's wide array of geometry and annotation capabilities. Although all of the gear geometry was easily modified with the stretch function, the hatching wasn't updated and had to be deleted and recreated. Anvil-1000MD allows algebraic expressions and mixed units to be used any time numeric input is required. Variables can be used to store results for later use.

Modifications such as trimming, intersecting, fillets, and chamfers work with all types of geometry. Object snaps for endpoints, midpoints, centers, extremes, and

intersections are always available from the keyboard without additional menu picks. The product's comprehensive dimension types include rarely found geometric tolerances, surface finishes, and section arrows. Default settings for the ANSI 1973, ANSI 1982, BSI, DIN, ISO, and JIS standards along with a multitude of specific modal settings provide for complete control of the appearance and positioning of dimensions and tolerances.

THE NEXT DIMENSION

One of Anvil-1000MD's special features is its ability to create an isometric projection by picking objects from a view and specifying the angle and depth of projection. The result, however, is a 2-D layout that must be cleaned up manually—there's no facility for automatically removing hidden lines.

The package included no specific support for working with double lines, so creating the walls in our floor plan was quite involved. For bill-of-materials creation, Anvil-1000MD supports part number and description attributes attached to a group of objects; there are also four user-specified fields.

Anvil-1000MD works well when it

Suitability to Task: 2-D CAD Software

In the GUI world, many CAD packages have gotten easier to use, but some have done so at the expense of power or performance. Others have managed to maintain the necessary balance between power and ease. For users, there remain a couple of crucial questions: whether a package emphasizes architectural or mechanical tasks and whether a package can manage data efficiently, even over a network.

Each package gets rated with two scores for performance: Power and Ease. Power refers to the wealth and strength of features offered to solve a given task, while Ease refers to the way each package implements the features. The latter also considers usability, a measure of how difficult a product is to learn, and a package's flexibility under real-world circumstances.

Architectural drawing is a specialty of some packages. Features such as drawing and cleaning up intersections of double lines are a necessity. Packages without such features are rated poor on this task. We also expect robust .DXF import filters. Packages that prove to be excellent at architectural design allow the user to create horizontal, vertical, and aligned (angled) dimensions in a variety of styles.

To rate an *excellent* on Power and Ease in **mechanical drawing**, the package must have a full

complement of basic geometry entities and must support Bezier curves, splines, and polylines. Hatching inside complex boundaries (including boundaries with islands) and an assortment of predefined hatch patterns are also expected features if the package is to rate above *good*. Packages that do not offer both radial and diametral dimensioning styles and associative dimensioning receive lower ratings.

Packages that do well in our **workgroup**

SUITABILITY TO TASK		
	Power	Ease of Use
Architectural drawing	GOOD	POOR
Mechanical drawing	EXCELLENT	EXCELLENT
Workgroup support	GOOD	EXCELLENT
Data management	GOOD	EXCELLENT

support task follow the conventional file- and record-locking protocols, but take it one step further by wiring in network support for such things as identifying the user who is currently editing the drawing or instructing the package to notify the waiting user when the file is available.

We evaluate **data management** as an adjunct to the mechanical and architectural drawing tasks. For example, if the software can generate a parts list and a bill of materials of the items in our architectural drawing task and supports DDE links to other programs accessing that data, it garners a rating of *good*.

Products that were unable to complete a given task receive an N/A for that task.

▶ FACT FILE

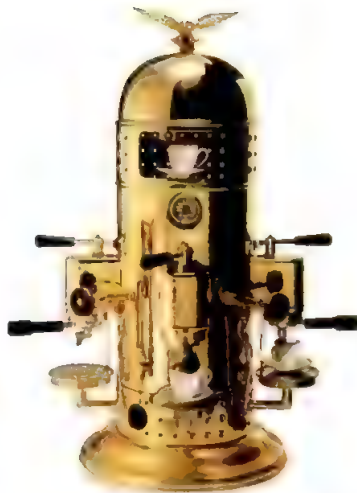
Anvil-1000MD for Windows, Version 2.00

List price: \$2,595 **Requires:** 386-based PC or better, 4MB RAM, 2MB hard disk space, math coprocessor, Microsoft Windows 3.1 or later. **In short:** Anvil-1000MD is a powerful and functionally complete CAD system targeted at mechanical design applications that was among the fastest products we tested. Unfortunately, it falls short with its Windows implementation. Not only does it lack drop-down menus that current Windows users might be familiar with, but support for cut-and-paste, drag-and-drop, DDE, and OLE are also missing from Anvil-1000MD. In addition, it doesn't utilize Windows printer or plotter drivers.

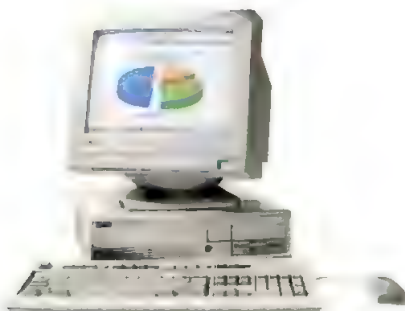
Interactive Design Consultants, 12721 Wolf Rd., Geneseo, IL 61254; 309-944-8108, fax, 309-944-6532

466 on reader service card

SUITABILITY TO TASK		
	Power	Ease of Use
Architectural drawing	FAIR	FAIR
Mechanical drawing	EXCELLENT	FAIR
Workgroup support	FAIR	FAIR
Data management	FAIR	FAIR



**Ever come out spending twice as much
as you planned going in?**



**You won't with the new CelebrisTM
from Digital.**

**Speak directly with Digital — and get
the Celebris you need. No more. No less.**

1 800 396-2217

For the full story, turn the page.

The new Digital Celebris. Direct from the people who build it.

When a PC has all you need and then some, who pays for all that "and then some"? You do.

But not with our versatile new Celebris series. It's especially easy to set up and use. *And* to configure to your exact specs and budget—not someone else's.

Our on-screen "Getting Started" set-up program actually walks you through the ins and outs. Need to get into the box? The chassis opens from the front *without tools* or having to disconnect peripherals.

Customizing? This new PC has plenty of speed and memory options to choose from—plus the latest Plug and Play technology so it comes Microsoft® Chicago-ready.

Best of all, the people at Digital are here to make sure you get it right.

With all these easy features—and Energy Star compliance, too—what more could you ask for? How about:

• **Free 3-Year Comprehensive Warranty***—including a full year of on-site service. *PC Computing*** gave us Five Stars for our "support network and huge field staff."

• **Risk-Free Purchasing**—Celebris comes fully configured, ready to run and network-certified. If you're not satisfied for any reason, return it within 30 days for a full refund—no questions asked.

• **Choice of payment options**—purchase orders, checks, Visa and MasterCard, American Express, Digital credit card—even leasing.

So get the exact performance you need with Celebris. And the exact support you need direct from Digital.



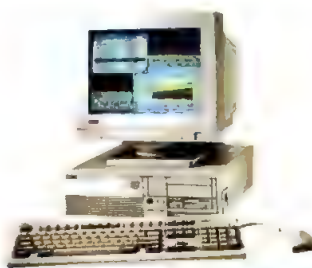
Celebris 466/4100

- **Chassis:** Slimline
- **Processor:** IntelDX2,™ IntelDX4™
- **Disk drive:** 3.5" 1.44MB
- **Bus:** PCI/ISA
- **RAM:** 8MB to 128MB
- **Secondary cache:** 256KB
- **Hard disk:** 270MB (540MB optional)
- **Slots:** 1 ISA, 1 PCI/ISA, 1 PCI
- **Graphics:** S3™ 864 with Hawkeye drivers
- **Monitor:** 14" SVGA color
- **Software:** Pre-installed MS-DOS® & Windows™ for Workgroups

\$2,248/\$2,598

\$79/mo.
lease

\$90/mo.
lease



Celebris 560/590

- **Chassis:** Slimline
- **Processor:** Pentium™
- **Disk drive:** 3.5" 1.44MB
- **Bus:** PCI/ISA
- **RAM:** 8MB to 128MB
- **Secondary cache:** 256KB to 512KB
- **Hard disk:** 270MB (540MB optional)
- **Slots:** 1 ISA, 1 PCI/ISA, 1 PCI
- **Graphics:** S3 864 with Hawkeye drivers
- **Monitor:** 14" SVGA color
- **Software:** Pre-installed MS-DOS & Windows for Workgroups

\$2,498/\$2,798

\$87/mo.
lease

\$97/mo.
lease



Celebris™ 590

- **Chassis:** Full Profile
- **Processor:** Pentium™
- **Disk drive:** 3.5" 1.44MB
- **Bus:** PCI/ISA
- **RAM:** 8MB to 128MB
- **Secondary cache:** 256KB to 512KB
- **Hard disk:** 540MB
- **Slots:** 3 ISA, 1 PCI/ISA, 1 PCI
- **Graphics:** S3 864 with Hawkeye drivers
- **Monitor:** 14" SVGA color
- **Software:** Pre-installed MS-DOS & Windows for Workgroups

\$3,098

\$108/mo.
lease

To order the new Digital Celebris, call.



1 800 396-2217

8:30 am to 8:00 pm ET, Mon.–Fri.
Please reference JDQ when you call.

digital™
PC
Beyond the box.

*DIGITAL EQUIPMENT CORPORATION, 1994. The DIGITAL logo and Celebris are trademarks of the Digital Equipment Corporation. The Intel Inside logo is a registered trademark, and IntelDX2, IntelDX4, Pentium and the Pentium processor logo are trademarks of Intel Corporation. Microsoft and MS-DOS are registered trademarks, and Windows is a trademark of Microsoft Corporation. S3 is a trademark of S3 Corporation. Digital believes that the information in this advertisement is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any errors.

*Three-year limited hardware warranty. Certain restrictions and exclusions apply. **July 1994 issue.



With graphically drawn menus and macro buttons, Anvil-1000MD doesn't look or act like a Windows application. Mechanical design, versatile dimensioning, and 2-D geometry creation are Anvil-1000MD's fortes.

comes to sharing information. It includes a reference drawing capability that allows you to use data from other drawings. Monochrome PCX files can be imported to assist in the tracing of scanned drawings, and machine-independent drawing locking allows Anvil-1000MD to work cooperatively in a heterogeneous network environment.

Anvil-1000MD was one of the performance leaders among the products we tested. Yet some Microsoft Windows users might still be disappointed by the product's lack of support for cut-and-paste, DDE, and OLE. Strong 2-D geometry and annotation features tailored for mechanical design, along with the package's support for a wide variety of Unix platforms, make Anvil-1000MD a viable solution for the mechanical design market. But as a Windows-based CAD system it falls short of the mark.

Autodesk Inc.

EDITORS' CHOICE AutoCAD Release 12 for Windows

BY WILL SCHLETER

Combine the de facto standard for PC-based CAD systems with today's most popular operating environment, and you get AutoCAD Release 12 for Windows. Autodesk's \$3,750 mammoth system provides—with a lot of help from myriad third-party add-ons—enough tools to do any CAD-related job.

Release 12 is the first version of Auto-

CAD to support Microsoft Windows directly, and all of the standard features you expect to find in a Windows based interface are there—pull-down menus, toolbars, and dialog boxes, as well as Clipboard, DDE, and OLE support. However, AutoCAD still retains its command-line prompt in a separate text-only window. In fact, some functions are still only available via the command line. Also, AutoCAD provides the option of using its old-style menus to retain compatibility with any customized menus you may already have. The package includes context-sensitive on-

line help and a comprehensive set of manuals, but no free technical support is available directly from Autodesk (although you can access the AutoCAD CompuServe forum). AutoCAD is sold and supported through a world-wide network of authorized distributors.

SPEEDY BYPASS

Autodesk has gone to great lengths to provide the best performance possible within Windows. While most systems are content to work with the standard Windows graphics display driver, AutoCAD lets you work in one of two modes, standard or accelerated. In accelerated mode, AutoCAD maintains a display list in memory and bypasses the Windows GDI (Graphics Device Interface) for certain operations. This approach greatly speeds up the display of graphics in most cases, but is incompatible with a few types of graphics cards. (The company commonly places patches for these purposes on CompuServe). Since the initial redraw is actually slower and subsequent redraws show a tenfold performance improvement, the benefit of accelerated mode could not be shown on our Screen Regeneration test.

Another benefit provided by AutoCAD's accelerated display mode is its Aerial view, a small window that contains an overview of the entire drawing and allows quick panning and zoom-

► FACT FILE

AutoCAD Release 12 for Windows

List price: \$3,750 **Requires:** 386-based PC or better, 8MB RAM, 8MB hard disk space, math coprocessor, Microsoft Windows 3.1 or later **In short:** The king of the PC CAD hill, AutoCAD Release 12 for Windows eschews the Windows extension of Release 11 to become a full GUI citizen. In addition to providing an impressive array of features for creating architectural and mechanical 2-D drawings, Autodesk's product continues to maintain unparalleled third-party support. With demanding hardware requirements and an imposing price tag, AutoCAD for Windows targets professional, full-time computer-aided design users.

Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965, 800-964-6432, 415-332-2344, fax, 415-331-8093

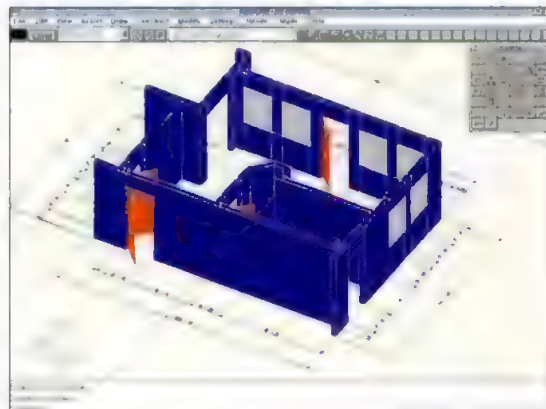
467 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	EXCELLENT	GOOD
Mechanical drawing	EXCELLENT	GOOD
Workgroup support	EXCELLENT	EXCELLENT
Data management	GOOD	GOOD

ing to any location. Also, AutoCAD maintains unparalleled support for digitizer tablets, allowing them to be used both as standard Windows input devices and as command overlays that streamline and customize the AutoCAD interface.

Neither of our test drawings posed any real problems for AutoCAD. Creation and modification of both the gear drawing and the floor plan was straightforward. If you use the AutoCAD Renderer, you can specify light sources and materials for a



AutoCAD, with built-in shading and rendering, lets you move easily from 2-D to 3-D views. If you're in AutoCAD's accelerated display mode, you can access an overview of the entire drawing that allows quick panning and zooming.

Performance Tests: 2-D CAD Software

Speed remains a primary concern for the CAD professional, and some vendors have gone to great lengths to maintain DOS-level performance while still running under Windows.

What the Numbers Mean

Some of the packages in this roundup proved to be well optimized for performance, while others took their time at executing such routine tasks as plot-to-file and screen regeneration. Anvil-1000MD was fastest on our Radial Copy and Rotate test, with Drawbase 4000 coming in a close second. The MicroStation packages surprised us with less-than-impressive scores in excess of 2.5 minutes on our Radial Copy and Rotate test. As a comparison, AutoCAD's numbers were more than seven times as fast on that test. AutoCAD offered two modes of operation, accelerated and standard. On average, its performance in accelerated mode was 10 percent slower on our Screen Regeneration test than when in standard mode. The numbers reported here reflect tests run in standard mode.

Both Cadvance and Drawbase had difficulty importing our test .DXF files. We had to change the incorrectly imported linetype definitions manually before running the tests. Our Radial Copy and Rotate test presented a problem for MicroGDS and TurboCAD. MicroGDS is limited to generating 100 copies in a radial copy operation, and was thus unable to complete the test and received an N/A. Our Radial Copy and Rotate test quickly surpassed TurboCAD's internal limit of 16,000 entities. This caused the program to crash during the test. As a result, it also received an N/A. When completed, the Radial Copy and Rotate test creates 22,000 entities.

How We Tested

We ran all performance tests on Compaq Deskpro 66M systems featuring 486DX2/66 processors. We configured each of these EISA systems with 16MB of RAM, a Seagate ST3655A hard disk, and DOS 6.2. We installed Windows 3.1, Windows NT, or OS/2 2.11 as required by each product. We used Matrox's MGA Impression graphics accelerator cards to drive NEC MultiSync 4FG monitors. For our input devices, we used Kurta XGT digitizing tablets, and we used the Hewlett-Packard HP 7550A as our plotter. Our workgroup consisted of three workstations and a file server running NetWare 3.12.

For our **Plot to File** test, we set up the applications to print to an 8.5- by 11-inch page. Our test file contained 5,625 objects (3,759 lines and 1,875 arcs). We measured the time the application took to plot the data to a file.

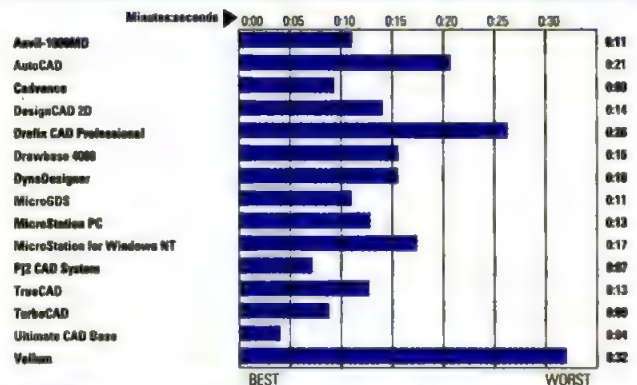
For our **Screen Regeneration** test, we lowered the display tolerance until line segments were no longer visible and measured the time each package took to regenerate our test file in-screen. If the package supported both redraws and regenerations, we used the equivalent of a regen. During this test, we made sure that each package was not approximating the screen representations of nonlinear entities such as arcs and circles.

For our **Radial Copy and Rotate** test, we created a radial array using

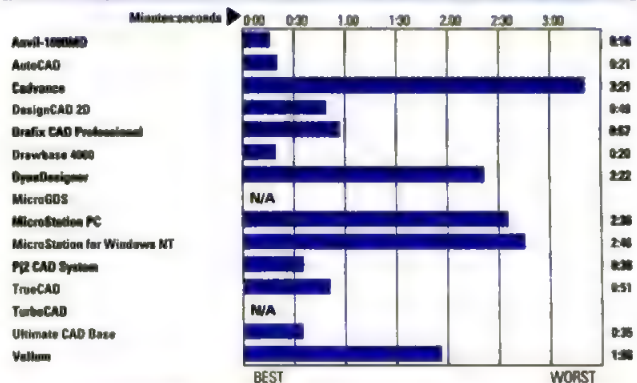
the center point of the circle as the center of the array by creating 359 additional copies of everything outside the circle at one-degree increments. We measured the time it took each package to rotate the entities as they were copied. We did not include the circle itself in the array.

In addition to running our performance tests, we evaluate these packages by using each to reproduce a complex facility layout. This includes but is not limited to placing geometry and text on individual layers. We also evaluate each package's symbol library as well as its ability to create native symbols and attach data to them. To test mechanical drawing abilities, we draw a 3-inch spur gear to exact specification and then change several attributes, such as the gear's pitch diameter and its thickness. —Analysis written by Jeff Mace

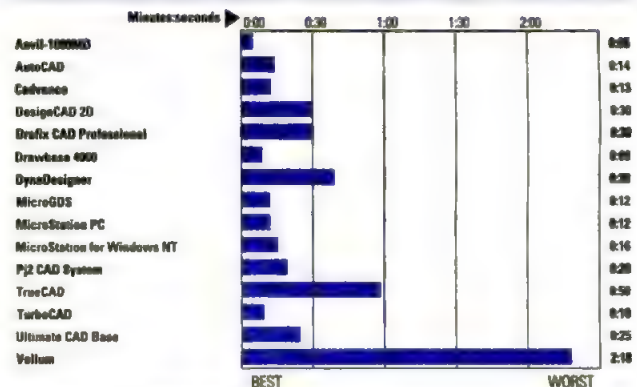
SCREEN REGENERATION



RADIAL COPY AND ROTATE

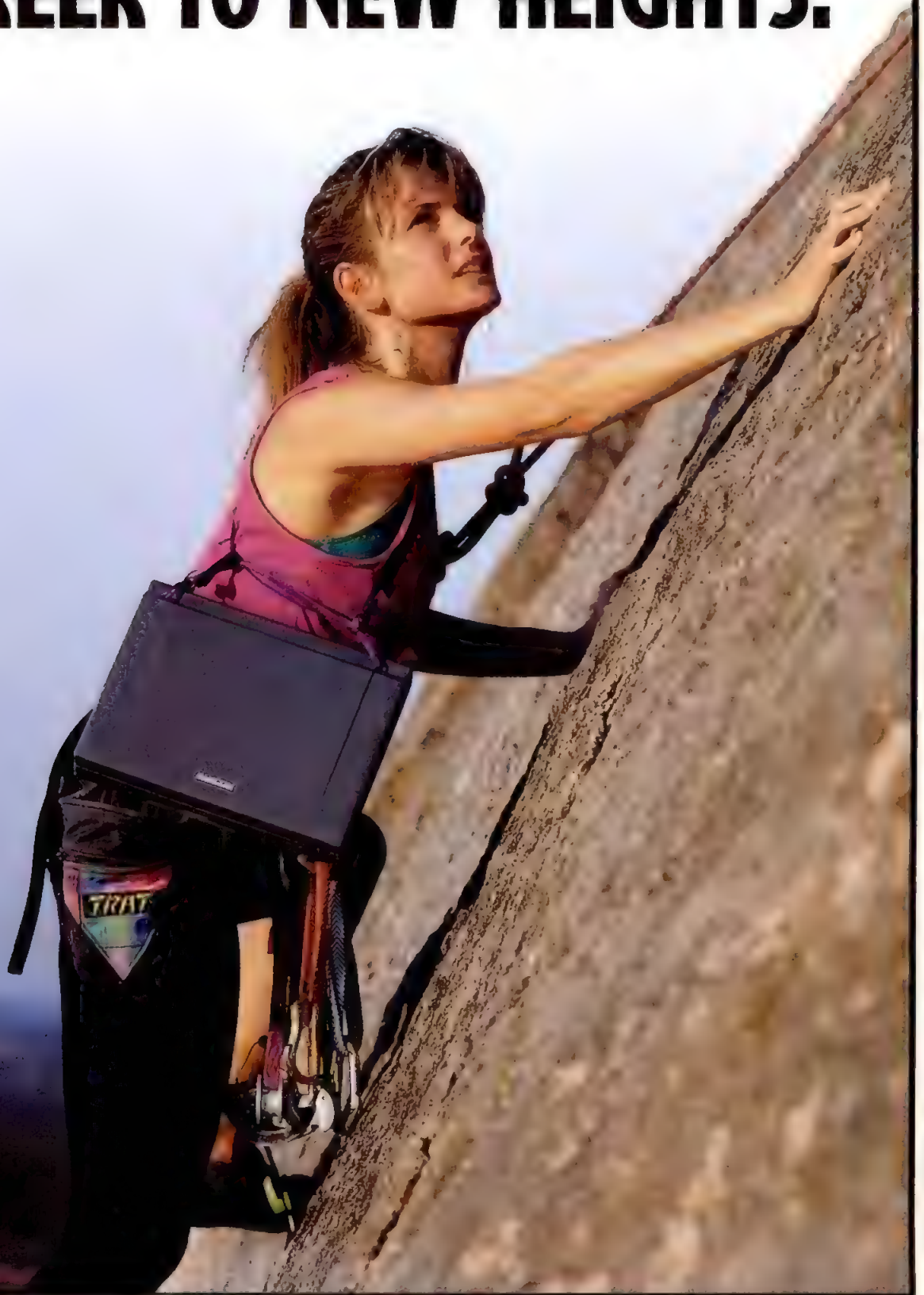


PLOT TO FILE



N/A - Not applicable. The product could not complete this test.

SANDY IS TAKING HER CAREER TO NEW HEIGHTS.



AUSTIN DIRECT HELPS HER SCALE ANY OBSTACLE.

In Sandy's business, it's tough to climb the ladder of success. But Austin direct helps her stay on top. With a powerful little notebook for when it's time to hit the trail. And a rock-solid desktop system for her office.

DX4-DRIVEN NOTEBOOK. KING OF THE MOUNTAIN.

For the ultimate in laptop performance, choose Austin's new DX4-powered notebooks. Intel's DX4 chip is the most powerful technology available for notebooks today. And our laptops have the expandability and flexibility that make them tough to beat.



PENTIUM™-PROCESSOR BASED DESKTOPS. THE PINNACLE OF POWER.

You'll conquer mountains of work in no time with Austin's new Pentium-based desktop computers. With plenty of



power to handle today's — and tomorrow's — desktop applications. Austin direct offers custom systems, flexible configurations, and multiple upgrade options. And best of all, they're affordable and available right now.



SERVICE AND SUPPORT THAT WON'T KEEP YOU HANGING

- ✓ An average tech support response time of *under two minutes*
- ✓ Award-winning systems
- ✓ Top rated service and support
- ✓ Lifetime tech support seven days a week, *twenty-four hours a day*



- ✓ *Three year warranty* on desktops: first year on-site, second and third year parts and labor
- ✓ One year warranty on notebooks
- ✓ 30-day money back guarantee



THE WORD'S GETTING OUT.

"...among the new class of portables, these fine components add up to a hard-to-beat combination."

PC Magazine, December 1993

"Blazing Performance."

Windows Magazine, January 1994

"If you're looking for the most speed and capacity for your dollar, this is the system for you."

Home Office Magazine, March 1994



CHOOSE ONE THAT'S RIGHT FOR YOU.

POWER SYSTEM-90

- Intel 90MHz Pentium™ Processor
- 8 MB RAM, 256 KB L2 Cache
- Double Speed CD-ROM
- 3.5" 1.44 MB Diskette Drive
- 2 PCI, 1 PCI/ISA and 4 ISA Slots
- PCI-Bus Windows Accelerator with 2 MB
- Desktop chassis
- 101-Key Keyboard & Mouse
- MS-DOS 6.22, Windows 3.11, & MS Works 3.0

\$2,649

Lease \$105/mo

- 8 MB RAM
- 425 MB Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

\$2,999

Lease \$119/mo

- 8 MB RAM
- 1 GB IDE Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

\$3,659

Lease \$146/mo

- 16 MB RAM
- 1 GB IDE Hard Drive (PCI)
- 17" Austin NI SVGA Monitor, .28mm

POWER SYSTEM-66

- Intel 66MHz Pentium Processor
- 8 MB RAM, 256 KB L2 Cache
- Double Speed CD-ROM
- 3.5" 1.44 MB Diskette Drive
- 2 PCI, 1 PCI/ISA and 4 ISA Slots
- PCI-Bus Windows Accelerator with 2 MB
- Desktop chassis
- 101-Key Keyboard & Mouse
- MS-DOS 6.22, Windows 3.11, & MS Works 3.0

\$2,429

Lease \$97/mo

- 8 MB RAM
- 425 MB Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

\$2,529

Lease \$101/mo

- 8 MB RAM
- 540 MB IDE Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

\$2,759

Lease \$110/mo

- 8 MB RAM
- 1 GB IDE Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

POWER SYSTEM-60

- Intel 60MHz Pentium Processor
- 8 MB RAM, 256 KB L2 Cache
- Double Speed CD-ROM
- 3.5" 1.44 MB Diskette Drive
- 2 PCI, 1 PCI/ISA and 4 ISA Slots
- PCI-Bus Windows Accelerator with 1 MB
- Desktop chassis
- 101-Key Keyboard & Mouse
- MS-DOS 6.22, Windows 3.11, & MS Works 3.0

\$2,099

Lease \$83/mo

- 8 MB RAM
- 425 MB Hard Drive (PCI)
- 14" Austin NI SVGA Monitor, .28mm

\$2,199

Lease \$87/mo

- 8 MB RAM
- 540 MB IDE Hard Drive (PCI)
- 14" Austin NI SVGA Monitor, .28mm

\$2,499

Lease \$99/mo

- 8 MB RAM
- 1 GB IDE Hard Drive (PCI)
- 15" Austin NI SVGA Monitor, .28mm

PREMIER 486DX2-66

- Intel 486DX2-66 Processor
- 8 MB RAM, 128 KB L2 Cache
- Double Speed CD-ROM
- 3.5" 1.44 MB Diskette Drive
- 2 VL and 5 16-bit ISA Slots
- Local-Bus Windows Accelerator with 1 MB
- Desktop chassis
- 101-Key Keyboard & Mouse
- MS-DOS 6.22, Windows 3.11, & MS Works 3.0

\$1,799

Lease \$72/mo

- 8 MB RAM
- 212 MB Hard Drive
- 14" Austin NI SVGA Monitor, .28mm

\$1,899

Lease \$76/mo

- 8 MB RAM
- 425 MB IDE Hard Drive
- 14" Austin NI SVGA Monitor, .28mm

\$1,999

Lease \$80/mo

- 8 MB RAM
- 540 MB IDE Hard Drive
- 15" Austin NI SVGA Monitor, .28mm

AUSTIN NOTEBOOKS

- Intel 486™SX, DX2 or DX4 Processors
- 4 MB or 8 MB RAM Expandable to 32 MB
- 127 MB to 524 MB IDE Drive, User Replaceable
- 3.5" 1.44 MB Diskette Drive
- Local Bus Video with 1 MB VRAM
- Local Bus IDE
- 9.5" Monochrome, DSTN or TFT Active Color Screen
- 2 Type II or 1 Type III PCMCIA Slots
- Integrated 16mm Trackball
- DX4 Series 16-Bit Business Audio Features Including Built-In Microphone and Speaker, External Jacks for Line In and Line Out
- EPP/ECP Parallel Port, 16550 High Speed Serial Port
- Advanced Power Management
- 1 Parallel, 2 Serial, Keyboard Port, VGA Port
- Dimensions: 11.1" x 8.58" x 2"
- Weight: 6.3 lbs. with battery

ROAD WARRIOR PACKAGE™

- Premium Notebook Carrying Case
 - 14.4 Internal Fax/Modem
 - Car Power Adapter
 - External Charger
 - NiMH Spare Battery Back
- Package Price, \$490
(Separately, \$585)

DUAL SCAN SCREEN

\$2,029 AUSTIN 486SX-33

- 4 MB RAM and 262 MB Hard Drive
- Lease \$81/mo

\$2,229 AUSTIN 486DX2-50

- 4 MB RAM and 262 MB Hard Drive
- Lease \$89/mo

\$2,579 AUSTIN 486DX2-66

- 8 MB RAM and 340 MB Hard Drive
- Lease \$94/mo

\$2,849 AUSTIN 486DX4-75

- 8 MB RAM and 340 MB Hard Drive
- Lease \$113/mo

\$3,199 AUSTIN 486DX4-100

- 8 MB RAM and 524 MB Hard Drive
- Lease \$127/mo

ACTIVE MATRIX SCREEN

\$3,149 AUSTIN 486SX-33

- 4 MB RAM and 340 MB Hard Drive
- Lease \$125/mo

\$3,299 AUSTIN 486DX2-50

- 4 MB RAM and 262 MB Hard Drive
- Lease \$131/mo

\$3,489 AUSTIN 486DX2-66

- 8 MB RAM and 340 MB Hard Drive
- Lease \$139/mo

\$3,899 AUSTIN 486DX4-75

- 8 MB RAM and 524 MB Hard Drive
- Lease \$155/mo

\$4,099 AUSTIN 486DX4-100

- 8 MB RAM and 524 MB Hard Drive
- Lease \$127/mo

MONOCHROME SCREEN

\$1,439 AUSTIN 486SX-33

- 4 MB RAM and 127 MB Hard Drive
- Lease \$57/mo

\$1,739 AUSTIN 486DX2-50

- 4 MB RAM and 262 MB Hard Drive
- Lease \$69/mo

\$1,959 AUSTIN 486DX2-66

- 8 MB RAM and 127 MB Hard Drive
- Lease \$78/mo

NOTEBOOK ACCESSORIES

- 4 MB RAM, \$219; 16 MB RAM, CALL; Docking Station, \$299; Car Adapter, \$59; PCMCIA 14.4 Fax/Modem, \$299; Built-In 14.4 Fax/Modem, \$199; PCMCIA Ethernet Adapter, \$220 (Only with system purchase.)

Ask your Austin Direct sales representative about additional configurations.



**AUSTIN
D-I-R-E-C-T**

1-800-483-9938

Ad Code: PCM102594

©1994 Austin Direct. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corp. Intel Pentium, DX4, DX2, DX are trademarks of Intel Corp. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. The above are special promotional prices. Prices and specifications are subject to change without notice. We are not responsible for errors in typography and photography. *Lease term reflects 36-month contract.



2121 Energy Drive, Austin, Texas 78758
512-339-3500 • FAX 512-454-1357

Government Sales: 1-800-833-4472
Fortune 1000 Sales: 1-800-622-5506
For More Information By Fax: 1-800-341-7500

3-D model and display multiple rendered views in a special window. Interfacing AutoCAD with an external database-management system is supported by the AutoCAD SQL Extensions (ASE) provided with AutoCAD or via AutoCAD's support of the Open Database Connectivity (ODBC) Windows standard.

AutoCAD features full support for networking, cross-platform compatibility with Macintosh and most Unix-based workstations, and a full-featured AutoLISP macro language. (There is another language that Autodesk has developed for third-party add-on developers called the AutoCAD Development System, or ADS.) AutoCAD, as the biggest player in the PC CAD marketplace, supports just about everything and everyone. If you had to pick a single reason for AutoCAD's success, it has to be the bandwagon of support provided for it. By the time you read this, AutoCAD Release 13 for Windows may be shipping. (For information about features that should be included in the upgrade, see the sidebar "CAD for Now and the Future.")

LESS FILLING

Does spending thousands of dollars for a system that you will use only occasionally make sense? Probably not. But how about a \$495 system, 100 percent compatible with AutoCAD .DWG files, that includes most of the basic features of AutoCAD? Enter AutoCAD LT for Windows. Based on AutoCAD Release 12, it has the same user interface and includes most of its older sibling's 2-D geometry and drafting, but lacks digitizer support, AutoLISP programming, support for ADS (and thus for the add-ons), DDE support, IGES translators, and database support via SQL and ODBC.

AutoCAD is the lifeblood of many firms that rely on customized third-party apps, the scores of trained users being produced by local community colleges and technical schools, and on the support and stability of a well-known package. AutoCAD may not be the easiest, the fastest, or the fanciest, but it is the leader. There are many excellent CAD systems costing thousands of dollars less than AutoCAD. But if you need a sound investment with solid functionality that won't let you down, AutoCAD is still the best bet in town.

Isicad Inc.

• Cadvance for Windows

BY ALAN D. SMITH

With one of the best Microsoft Windows interfaces we've seen yet for a CAD package, it's hard to imagine that Isicad's \$1,995 Cadvance for Windows, Version 6, had its origins in the DOS world. Judging from its simple and well-organized layout, one can see that a lot of thought went into moving this product to Windows. The product's ample drawing space is surrounded by a well-designed, easy-to-use interface.

It's in the architectural arena that Cadvance proves itself most worthy. Symbol placement in walls allows for automatic double-line trimming and easy attribute creation. Select from the Symbol menu, and an Attribute definition window appears with Field Name and Field Value controls. Values can be automatically numbered by the system or by the user at the time of insertion. The Building Grids menu adds even more architectural features.

As for functionality, Cadvance handled our architectural design tests quite well, though it displayed some weakness on our mechanical drawing tests. For example, the program provides

no associated dimensions. Also, while Cadvance provides a hatching method called Texture, there are predefined patterns for everyday mechanical materials.

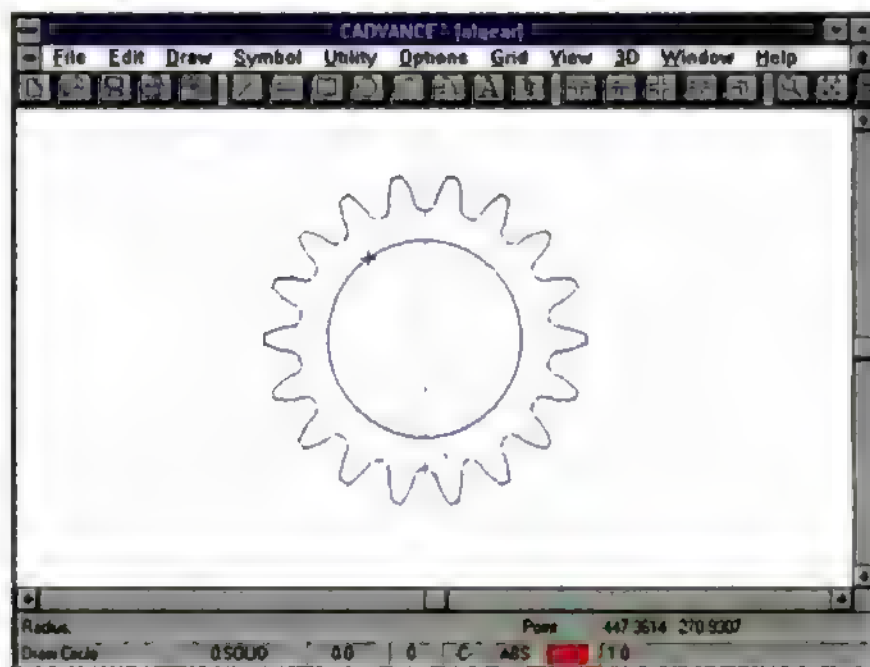
Cadvance's interface consists of one row of drop-down menus along the top of the screen and a toolbar below that. These icons are large enough to read and easy to understand. If you click on one of these icons, a message that prompts you for your next action appears in the status bar at the bottom of the screen. Also included in the status bar are two rows of quick-access controls. Among these are controls for current entity color, layer number, line type, object-snap control, coordinate controls, line width and types, and coordinate-tracking data.

DIMENSIONLESS

Unfortunately, Cadvance's dimensioning operation is not as smooth as its interface.

While Cadvance supports true metric dimensioning (AutoCAD does not), placing and modifying dimensions is still difficult. Precision placement of dimensions requires setting the global snap to the actual point location, such as vertex, line, arc, or intersection. In other words, you have to select the proper location for the dimension extension lines, then turn the global snap off in order to place the dimension on the drawing. Multiple steps for controlling the global snap make this an awkward process.

More frustrating is the omission of the .DXF and .DWG drawing translation files from the initial install disks. The only way



Cadvance has a well-organized screen and a large working area. You can quickly select such settings as colors, line-types, and snaps. The package performed well in our architectural drawing tasks.

to get these files is to return the registration card to Isicad. Although the program tells you you'll need the company's DWGX-VWF.DLL file to import AutoCAD drawings, we found that this same file was also necessary to import .DWG files.

When we did install the .DWG and .DXF translation files, we found that Cadvance converted many of our original solid lines into dashed lines. Apparently, Cadvance mapped one of the two line type styles included in the drawing (line type 0) to a dashed line. The other line style was correctly mapped to a solid line. According to technical support, Cadvance would have mapped line type 0 to a solid line if there had been more than eight line styles included in the drawing file. However, because there were only two, the product mapped line type 0 to the next available style, which was a dashed line. Cadvance does provide a quick fix. Once

HERE'S THE SMARTEST 15" COLOR MONITOR ON THE MARKET.



- ▶ **Precise Digital On-Screen Display**
Image easily adjusted with microprocessor-based digital controls
- ▶ **Easy On The Eyes**
Flat-Square, Non-Glare picture tube with .28mm dot pitch
- ▶ **High Resolution**
Maximum resolution 1280 x 1024, Non-Interlaced
- ▶ **Reliability-Tested**
With 50,000 Hour MTBF
One year warranty supported nationally by Magnavox
- ▶ **Autoscanning Capability**
Horizontal scanning from 30 to 66KHz, Vertical from 50 to 110Hz
- ▶ **Switchable Macintosh® Adapter Included**



\$399 MSRP

MAGNAVOX HAS MONITORS TO MEET ANY APPLICATION.

MODEL#	7BM749	CM2080	CM2089	CM2099	CM4015	CM4017	20CM64
SCREEN SIZE	14"	14"	14"	14"	15"	17"	20"
MAX RESOLUTION	640 x 480 Non-Interlaced	640 x 480 (Mac) Non-Interlaced	1024 x 768 Interlaced	1024 x 768 Non-Interlaced	1280 x 1024 Non-Interlaced	1024 x 768 Non-Interlaced	1280 x 1024 Non-Interlaced
TYPE	Mono VGA	Color Mac™	SVGA	EVGA	EVGA	EVGA	Hi-Res
DOT PITCH	N/A	.28	.28	.28	.28	.31	.31
SCAN RATE H	31.5KHz	35.0KHz	31.5/35.2/35.5	30-48KHz	30-66KHz	30-58KHz	30-64KHz
SCREEN	Non-Glare	Glossy	Non-Glare	Non-Glare	Non-Glare	Non-Glare	Glossy
MFG. SUG. RETAIL	\$119	\$299	\$269	\$299	\$399	\$749	\$1,199

The Energy Star emblem does not represent EPA endorsement of any product or service. Macintosh is a registered trademark of Apple Computer, Inc.

Philips Consumer Electronics Company
A Division of Philips Electronics North America Corporation

CIRCLE 246 ON READER SERVICE CARD

► FACT FILE

Cadvance for Windows, Version 6

List price: \$1,995 **Requires:** 386-based PC or better, 4MB RAM, 5MB of hard disk space, Microsoft Windows 3.1 or later **In short:** Cadvance for Windows has made a graceful transition from the DOS world to the Microsoft Windows environment. Its intelligently designed interface includes drop-down menus, a toolbar, and a reasonably sized drawing area. Unfortunately, it is short on tools for mechanical drawing, lacks strong dimension edit controls, and features few hatch patterns. It does provide all the features you'll need for nearly any architectural application, but Isicad will have to clean up Cadvance's .DXF file-import routine in order for the program to be truly competitive in the architectural CAD market.

Isicad Inc., 1920 West Corporate Way, Anaheim, CA 92803-6122, 800-634-1223, 714-533-8910; fax, 714-533-8642

468 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	GOOD
Mechanical drawing	FAIR	GOOD
Workgroup support	FAIR	POOR
Data management	FAIR	GOOD

a file is brought into Cadvance, any line types can be changed with one basic menu pick. Selecting the Options/Line Style from the pull-down menus displays the mapping of line style numbers and names and a preview of the styles. By simply changing the style name, the graphics will change upon the next redraw.

NETWORK-AWARE

Cadvance is a network-aware product and even includes some rudimentary file locking for those working in a group situation. It also supports two industry database interface formats: dBASE and ODBC. When creating symbols with attributes, attribute files are created in Cadvance, but they must be linked to database files to be fully operative. Unfortunately, Cadvance lacks any report-generation capabilities.

Automatic double-line corner and intersection trimming make Cadvance a great choice for building-design applications. But the fact that the package lacks good dimension edit controls and has nonassociated dimensions and few hatch patterns will keep Cadvance out of mechanical design firms.

American Small Business Computers Inc.



EDITORS' CHOICE

DesignCAD 2D for Windows

BY JOEL N. ORR

The \$349 DesignCAD 2D for Windows, Version 7.0, from American Small Business Computers (ASBC) is powerful, inexpensive, and easy to use. The program makes you wonder: Why should I spend thousands for any other drafting program?

ASBC has incorporated lessons learned from users of its DOS-based products into DesignCAD 2D. The program is robust and reasonably fast, and it handles large drawings well. It lacks subtlety, but with its powerful BasicCAD programming language, ambitious users can add their own subtleties.

DesignCAD 2D—at home on both the mechanical drafter's system and in the architect's office—provides the idiosyncratic dimensioning and line styles of both professions. The lack of automatic intersection cleanup is an unfortunate omission on the architectural side, although you can automatically trim double lines.

We had no difficulty producing both the mechanical and architectural test drawings. But specialized tasks, such as placing a horizontal chord of a given length onto a circle, or projecting from one view into another, required more geometric manipulation than would be necessary in other products such as Anvil-1000MD. The good news is that the package's geometric commands were sufficient for every kind of construction we tried.

Our architectural test drawing brought out DesignCAD 2D's strengths in symbol creation and management. Any drawing can be defined as a symbol, previewed upon loading, and placed at any scale and angle. Changes to the symbol drawing appear in all drawings that reference it. You can also expand any symbol so its component parts are no longer tied to the reference file.

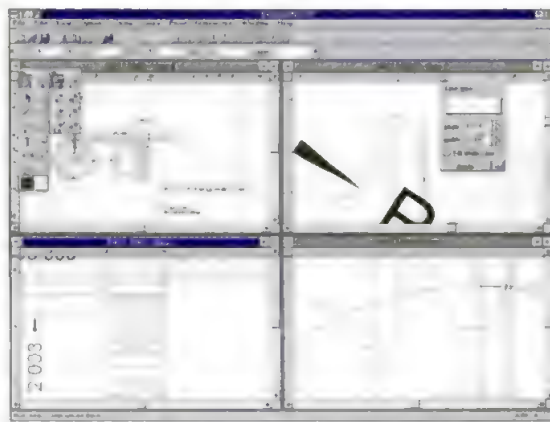
A customizable user interface supplies icons with pop-up choices and floating palettes for drawing entities, snaps, col-

ors, attributes, and more. You can customize everything from the choice of tools for each menu to the layout of those tools. Frequently used tools can be grouped in a "Hot" toolbox floating palette. Moreover, many of the useful keyboard shortcuts found in the DOS version have been carried over to the Windows version.

CAD is more complex than most Windows business applications, and each CAD vendor has had to augment Windows to make effective drafting possible. DesignCAD 2D's approach, which uses well-designed icons in toolbars and floating palettes, makes the program easy to learn.

In DesignCAD 2D, coordinate windows are always active, giving you precise control no matter what mode you're in. If you are positioning a graphical entity or moving one, hitting F6 lets you toggle among the windows and enter precise values into them instead of trying to position the object with a mouse or digitizer puck.

Ghost previews show you the effects of a given command before you complete it. This is particularly convenient for the rec-



DesignCAD 2D lets you arrange multiple views of the same drawing on your screen. Other ease-of-use features include ghost previews, support for TrueType fonts, and the placement of text at an angle or along an arc.

tangular and radial array functions. Moreover, DesignCAD 2D fully supports TrueType and PostScript fonts, even allowing the placement of text at an angle or along an arc. The package also allows for multiple views of the same drawing.

DesignCAD 2D's help files are only adequate and include no graphics, although the documentation is a little better. It includes a tutorial booklet, a reference manual, and a guide for the BasicCAD language.



The success of AutoCAD has inspired dozens of cheap imitations.

If you need a CAD package but don't need all the sophistication of AutoCAD® software, don't settle for a cheap imitation. Get new AutoCAD® LT for Windows:™

Unlike those "bargain" packages, it's based on the world standard—AutoCAD—and gives you features the others can't duplicate. Like more accurate 2D drawing tools

for designing

discrete parts. 3D design and layout tools and full support for layers and blocks.

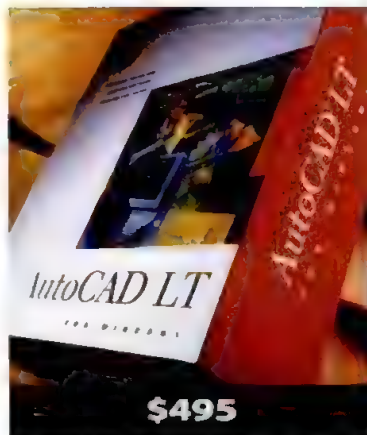
And drawings you can link, so changes on the master are automatically reflected in other drawings. What's more, making these drawings is as easy as using a few simple icons and tools. But if you do find

yourself with a question, you'll have access to on-line help as well as free 90-day product support. And since AutoCAD LT reads and writes data just like AutoCAD software, your work will be compatible with over a million AutoCAD users worldwide. Chances are your clients and colleagues are among them. So beware of cheap imitations. Visit your

And one inexpensive one.

Authorized

AutoCAD Dealer or leading retail software store. Or, for a free demo disk, call 1-800-228-3601 and ask us for Demopack A215. Outside the U.S. and Canada, fax 415-491-8311.



 Autodesk.

DESIGNER TESTS

While not a speed demon, DesignCAD 2D is reasonably fast and robust. It had one of the fastest times on our Radial Copy and Rotate test of any package we tested. Furthermore, DesignCAD 2D handled our large test plot file without a hitch, and none of the operations required by our test scripts slowed it down inordinately.

In DesignCAD 2D, attributes are simply assigned to a point rather than to a geometric entity. External programs can easily extract attributes from the database, but the lack of connection to a geometric entity limits the value of this function.

The package is not a true workgroup tool and as such does not support file locking. Users do have a path to 3-D CAD in the company's DesignCAD 3D, which is expected to be ported to Windows by the end of the year.

A competent DesignCAD 2D user would find little in AutoCAD or other more expensive packages that could not be approximated via BasicCAD macros. This inexpensive package is ready for real work and won't let you down.

▶ FACT FILE

DesignCAD 2D for Windows, Version 7.0

List price: \$349. **Requires:** 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. **In short:** Still among the most affordable and reliable CAD products available today, DesignCAD for Windows shines in the GUI environment. Equally at home in the architect's and mechanical designer's offices, DesignCAD features reasonably fast performance, dependable tools, and a customizable user interface. In addition, DesignCAD's powerful BasicCAD programming language lets users build their own macros. Overall, this inexpensive, robust, and programmable product is a great choice for nonnetworked practitioners.

American Small Business Computers Inc., One American Way, Pryor, OK 74361; 918-825-7555; fax, 918-825-6359

469 on-reader service card

SUITABILITY TO TASK		
	Power	Ease of Use
Architectural drawing	EXCELLENT	EXCELLENT
Mechanical drawing	GOOD	EXCELLENT
Workgroup support	FAIR	FAIR
Data management	FAIR	FAIR

Foresight Resources Corp.

• Drafix CAD Professional for Windows

BY ROD TAYLOR

The release of Foresight Resources Corp.'s Drafix CAD Professional for Windows, Version 3.0, raises the stakes in the Windows 2-D CAD market. The package now boasts a powerful database report generator, OLE server and DDE client support, a thoughtfully designed Windows interface, a customizable user environment, and a well-written users' manual—all at a competitive list price of \$495. A CD-ROM library of over 5,000 symbols and more than 90 new features make this version of Drafix CAD a formidable player in the 2-D CAD arena.

Drafix CAD's screen is divided into seven general regions: title bar, menu bar, property bar, edit bar, status bar, drawing window, and main toolbox. These regions furnish you with plenty of helpful information. Throughout the design process, Drafix CAD provides an assortment of features that let you do your work without having to memorize a lot of commands.

A CLICK AWAY

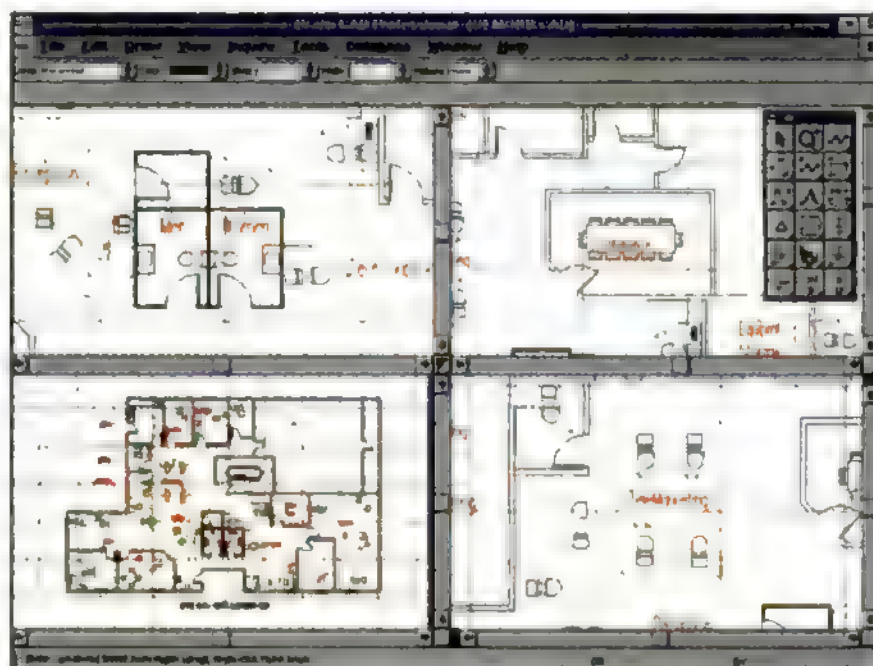
Everything you need to know about a given object in your drawing is only a couple of clicks away. Just click on the Inquire Entity Properties icon from the toolbox and select an object in your drawing. Drafix CAD immediately generates a spreadsheet-like window containing a complete description of the object you selected that includes, among other details, size, position, and line style.

Drafix CAD has a main toolbox with intuitively crafted icons for commonly used commands. Drafix CAD will even let you create and edit your own toolbox. Toolboxes are automatically saved to disk when you create or modify them. Since you can import a toolbox file from a network drive, you can share custom toolboxes with other users on your network.

Drafix CAD made short work of the house floor plan called for in our testing.

The walls were easy to create using the appropriate grid spacing and the Draw Line Double command. The generous supply of window and door symbols found in the Drafix CAD's General Architectural Symbols library were also useful. The Draw Symbols Insert command automatically opened a gap in the wall at locations where we placed window or door symbols in the drawing.

Solid fills in Drafix CAD were a mixed



Drafix CAD lets you display up to four simultaneous views of your drawing. Changes made in one view are reflected in the other three. The package includes a main toolbox, and you can also create and edit your own toolbox.

bag. Even though we could generate fills by selecting two adjoining line segments along the wall, Drafix CAD could not automatically fill double-line walls. Dimensioning the architectural drawing was facilitated through Drafix CAD's "chained dimensioning." This allowed us to draw a series of dimensions arranged side-by-side. Only the first dimension had to be set up; the other dimensions simply inherited the settings from the first one.

Drafix CAD was able to generate the gear schematic as easily as the house floor plan. Tasks such as radial copy, tolerancing, diameter dimensioning, and irregular polygon hatching were no problem for the product. Generating the gear tooth detail went smoothly. Drafix CAD let us simply copy a tooth from the main gear drawing and scale it to the proper size before applying its dimensions.

One of the primary features that sets Drafix CAD apart from traditional drawing programs is report generation. Reports in Drafix CAD can be either summary reports or detail reports. Summary reports display information for every

symbol in a selected group along with the number of times each symbol occurs in the drawing. When you want database information about every entity in a selected group, use detail reports. Both report types let you add a column of numeric fields and display their total.

Drafix CAD will even let you share information contained in report fields of a drawing with other applications via OLE. This lets you "package" your drawing so other Windows applications can display and print it.

There are a few areas in which Drafix CAD could use some improvement. It was among the slower packages reviewed in this roundup. There is no 3-D upgrade path for Drafix CAD, nor are there any tutorials. The .DXF translator, which mis-handled some of our solid fills and fonts, needs some more work.

Taken as a whole, Drafix CAD is an impressive product from a company that clearly understands what Windows-based CAD is all about. If your needs are strictly 2-D, and you need a CAD system that handles report generation and data sharing between applications, then consider Drafix CAD.

► FACT FILE

Drafix CAD Professional for Windows, Version 3.0

List price: \$495 **Requires:** 386-based PC or better (math coprocessor recommended), 2MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. **In short:** If you're looking for a 2-D CAD package at a competitive price, then consider Drafix CAD Professional for Windows. Featuring one of the better Windows interfaces for 2-D CAD we've seen, Drafix CAD offers ease of use, robust bill-of-materials capabilities, built-in DXF support, a well-written users' manual, and a 5,000-object symbol library on CD-ROM. Where this otherwise impressive product falls short is in handling solid fills, overall speed, and DXF translation.

Foresight Resources Corp., 10725 Ambassador Dr., Kansas City, MO 64153, 800-231-8574, 816-891-1040, fax, 816-891-8018

470 in reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	EXCELLENT
Mechanical drawing	GOOD	GOOD
Workgroup support	FAIR	GOOD
Data management	GOOD	GOOD

CADworks Inc.

● Drawbase for Windows Model 4000

BY BRYAN M. WINTER

In the battle to stake out a piece of the CAD software market, CADworks' \$4,400 Drawbase for Windows Model 4000, Version 1.2, stands as a true survivor. The Drawbase series has moved forward while still remaining true to its facilities management and architectural applications framework. CADworks has introduced a competent Microsoft Windows rewrite of its venerable software.

Drawbase 4000 is based upon the assumption that drawing an image is only one part of a much larger picture. The desks, chairs, or equipment that are drawn in a facilities floor plan are more than just images; every piece has links to Drawbase 4000's sophisticated database system. This allows for each piece of equipment or furniture in a company to be tracked and inventoried. Other 2-D CAD programs have such links, but few programs have matched the depth found in Drawbase 4000.

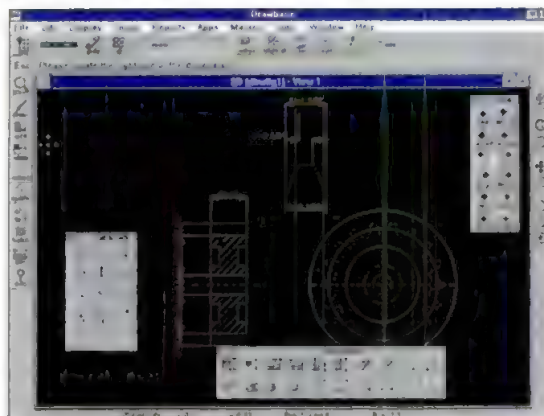
The Drawbase system comes in multiple flavors: 2000 (\$2,200) provides 2-D drawing without database functionality; 3000 (\$3,300) adds 3-D drawing; 4000 does not include 3-D drawing but adds database capability; and 5000 (\$5,500) has all the features. When we last reviewed Drawbase ("2-D Drafting: Why Pay More?" *PC Magazine*, February 23, 1993), the program was a digitizer-dependent, hardware-locked turnkey program with a distinctive DOS interface.

Interface-wise, Drawbase 4000 for Windows offers a big improvement over its DOS counterpart. Floating menus offer more flexibility, and can be moved or minimized to clear the drawing area. The pull-down menus all have associated icons on the button bar, and the commands are also described when the cursor passes over them. This is useful when a little browsing is needed to find a command in the various menus. You can still enter commands directly via the command line,

but the interface goes to lengths to avoid keyboard input. When numeric input is needed, Drawbase 4000 inserts a keypad next to the command line. Among the other notable features in the interface is a status bar that includes listings of line type, color, and layers for your drawing.

ACE OF BASE

Drawbase 4000's greatest strength lies in its database and report-generating facilities. It comes with a number of charts designed to track facilities functions, such as cable man-

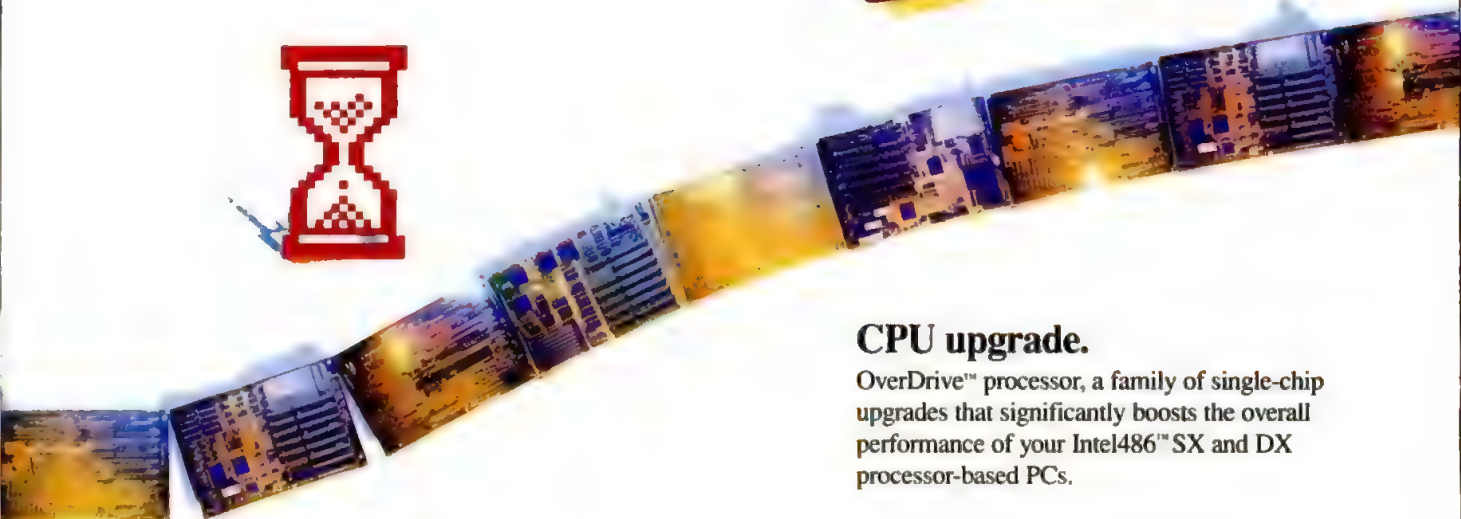
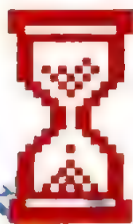


Drawbase offers tear-off menus that allow for flexible drawing. Among the other notable features in the interface is a status bar which includes listings of line type, color, and layers for your drawing.

agement and furniture tracking. Special consideration is put into area calculations, the bread and butter of facilities managers and leasing companies. You can also configure Drawbase 4000 to track other types of drawing data, such as the wood and other building materials required for a residential deck or mechanical design components. The report generator is equally impressive. You can select from a wide variety of database commands to manipulate, format, and generate database reports.

The program's strong drawing features are targeted directly at the architectural and facilities markets. For instance, construction geometry is a separate class of entities, which are lines and circles of infinite size that act as guidelines, helping you estimate the interaction between circle tangents, line offsets, and new elements. When constructing the gear in our mechanical drawing tests, offset construction lines helped us determine tangents as well as radial construction points on the tooth sides.

Special features such as wall opening



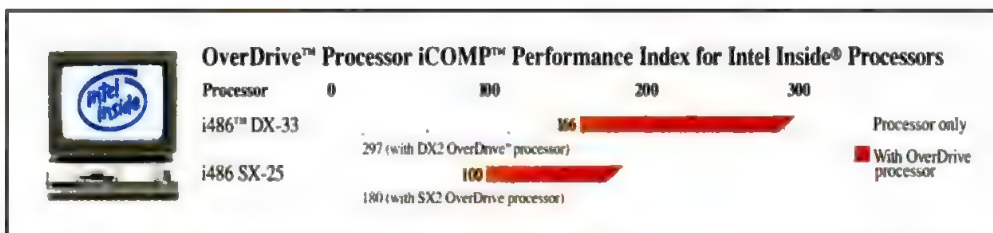
CPU upgrade.

OverDrive™ processor, a family of single-chip upgrades that significantly boosts the overall performance of your Intel486™ SX and DX processor-based PCs.

Slow performance.

Your software is bogged down, but you can't buy a new PC right now.

To speed up your 486,





Call 1-800-538-3373, ext. 178.[†]

To find out more about the IntelSX2™ and IntelDX2 OverDrive processors and to receive a free demo disk.

Speeds up software.

Microsoft Excel® 4.0 runs 83% faster and Microsoft Word® 2.0 65% faster when you upgrade a i486™ SX-33 processor with an IntelDX2™ 66 MHz OverDrive processor.

†For European residents, call +44 (0) 793 431155, and ask for infopack IOD16.
© 1994 Intel Corporation. *Other brands and names are the property of their respective owners.

follow the upgrade path.



OverDrive™ processor family of products

intel®

► SUMMARY OF FEATURES

2-D CAD Software

		PC MAGAZINE EDITORS' CHOICE		PC MAGAZINE EDITORS' CHOICE				
Products listed in alphabetical order	Anvil-1000MD for Windows	AutoCAD for Windows	Cadvice for Windows	DesignCAD 2D for Windows	Drafix CAD Professional for Windows	Drawbase for Windows Model 4000	DynaDesigner for Windows	MicroGDS
■ = YES □ = NO								
List price	\$2,595.00	\$3,750.00	\$1,995.00	\$349.00	\$495.00	\$4,400.00	\$399.00	\$3,250.00
General Features								
Supports DDE	□	■	■	□	■	□	□	■
Supports OLE1.0 client/server	□□	□■	■	□□	□■	□□	□□	■
Supports OLE 2.0 client/server	□□	□□	□□	□□	□□	□□	□□	□□
Supports paste-links	□	■	■	□	■	■	■	■
Supports drag-and-drop	□	■	■	□	■	■	■	■
Network support:								
Microsoft LAN Manager/NetBIOS	■	■	■	□□	■	■	■	■
NetWare/VINES	■	■	■	□□	■	■	■	■
Can be run from server	■	■	■	■	■	■	■	■
Supports file/layer locking	■□	■□	■□	□□	■	■	□■	■
File interchange (import/export):								
BMP	□□	■	■□	■□	□■	□■	□□	■
.DXF	■	■	■	■	■	■	■	■
HPGL 1	□■	■	■	■	■	□■	■	□■
HPGL 2	□■	□■	□■	■	□■	□■	■	□■
IGES	■	■	■	■	■	□□	□□	□□
.PCX	■	■□	□□	□□	□□	□■	□□	□□
TIFF	□□	■	■□	□□	□□	□□	□□	□□
.WMF	□□	■	□□	□□	■	□□	■	■
Cross-platform compatibility	■	■	□	■	■	■	□	■
Workspace Management								
Pan/Scroll	■	■	■	■	■	■□	■	■
Zoom	■	■	■	■	■	■	■	■
Object controls:								
Lock and unlock	□	□	■	■	□	■	□	■
Set visible and invisible	■	□	■	■	□	■	■	□
Group and ungroup/Regroup	■	■	■□	■	■	■	■	■
Move with rubberbanding	□	■	■	■	■	■	■	■
Break/trim objects	■	■	■	■	■	■	■	■
Resize	■	■	■	■	■	■	■	■
Rotate	■	■	■	■	■	■	■	■
Supports layers	■	■	■	■	■	■	■	■
Maximum number of layers	1,024	Unlimited	255	256	Unlimited	256	256	1,024
User can move objects between layers	■	■	■	■	■	■	■	■
User can name layers	□	■	■	■	■	■	■	■
File management:								
Supports long drawing names	□	□	□	□	□	□	□	□
Supports drawing libraries	■	■	■	■	■	■	■	■
Visual drawing catalog	□	□	□	■	□	□	■	□
Undo	■	■	■	■	■	■	■	■
Maximum number of levels	Unlimited from last save	Unlimited from last save	Unlimited	1	1	1	Unlimited	Unlimited
Interruptible redraw	□	■	■	■	■	■	■	■
Background redraw	□	□	□	□	■	□	□	□
Manual redraw	■	■	■	■	■	■	■	■
Drafting Tools								
Arcs/Circles	■	■	■	■	■	■	■	■
Curves/Ellipses	■	■□	■	■	■	■	■	■
Polylines/Polygons	■	■	■	■	■	■	■	■

CONTINUES

[illegible]

cuts, one-step trims, and a macro system make for higher productivity. Drawbase 4000 has been optimized for workgroup applications, such as architectural projects that require frequent estimates and production bids. Each drawing is stored as a series of files so that data can be read into spreadsheets without opening the entire drawing file. This method is somewhat outdated since many programs now have the database analyzed by an external program—AutoCAD, for example, uses the Autodesk Data Extension (ADE)—that extracts data, thus keeping down the number of files.

Drawbase 4000 has a niche market in facilities management, and it offers strong native database tools that can be used in a number of disciplines, especially if the user has the need to generate a lot of reports directly from a drawing. It is a stable and fast program that did well on our performance tests. As a standalone, it is a good database package, but database programs can be had for far less money to link into other packages. By trying to do both databasing and drawing, the package suffers somewhat in both areas. The Windows interface is very functional, but CADworks needs to

▶ FACT FILE

Drawbase for Windows Model 4000, Version 1.2

List price: \$4,400. Requires: 386-based PC or better (math coprocessor recommended), 8MB RAM, 10MB hard disk space, Microsoft Windows 3.1. **In short:** CADworks has done a good job of porting this 2-D, database-centric package to the Windows platform. In Drawbase 4000, every object in a facilities floor plan—whether it's a desk, a chair, or piece of equipment—is intrinsically tied to the product's sophisticated database system. Although the product is among the most expensive we looked at and suffers from more than its share of quirks, it remains a good tool for users who need a fully developed database system, facilities management, and an architectural design tool all in one application.

CADworks Inc., 222 Third St., #2300, Cambridge, MA
02142; 800-422-3957, 617-868-6003; fax 617-354-3057

471 on reader service card

	Power	Ease of Use
Architectural drawing	EXCELLENT	GOOD
Mechanical drawing	GOOD	GOOD
Workgroup support	GOOD	GOOD
Data management	EXCELLENT	GOOD



Not
everything in Texas
comes easy.
But our printers do.

You won't get thrown by a TI printer. Our family of friendly printers extends your reach – without extending your budget.

Easy to use. With TI's new easy set-up, just take a few simple steps and your printer driver is automatically loaded on your hard drive. And the Color Magic™ driver on our microMarc Color inkjet printer has easy-to-understand menus so even a beginner can

print professional quality documents.

Easy to maintain. From printheads to toner cartridges to imaging units, our long-life consumables can be dropped into place in seconds – even adding options is a snap.

Easy to service. We've built our printers to be trouble-free, complete with a one-year limited warranty and a toll-free technical support line.

Easy to own. Our printers have the friendliest prices around. We even offer a 30-day risk-free trial* to make sure you're perfectly satisfied.

Easy to buy. Just call 1-800-TI-TEXAS (1-800-848-3927). We'll send you literature and competitive comparisons within 24 hours with all the details you'll need to find the TI printer that's just right for you.



All prices are estimated street prices. Dealer prices may vary. *Offer applies to all new microMarc, microWriter, microLaser, and 8820 Forms printers, if returned in good condition. microMarc, microWriter, microLaser, Color Magic, and "Extending Your Reach" are trademarks of Texas Instruments Incorporated. OS/2 is a registered trademark of IBM Corp. Mac is a registered trademark of Apple Computer, Inc. Adobe, PostScript, Adobe Memory Booster, and the PostScript logo are registered trademarks of Adobe Systems, Inc. Windows is a registered trademark of Microsoft Corporation. PCL is a trademark of Hewlett-Packard, Inc. © 1994 TI



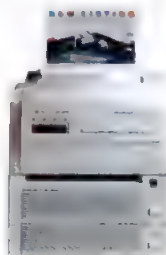
microMarc™ Color Printer
Under \$400.

This flexible color/black and white inkjet printer adds vivid color to your work. Windows™/DOS compatible.



microLaser™ Pro 600 Printer
Now Under \$1,300.

A feature packed, high performance 600 dpi printer. 8 pages per minute, 6 MB memory, two 250-sheet paper trays. Mac/Windows/DOS compatible. Optional multi-network interface now available.



NEW 12ppm microLaser PowerPro Printer
Under \$1,750.

Ideal for heavy graphics printing. 12 pages per minute, a turbo-charged processor, 600 dpi, 67 scalable fonts. Mac/Windows/DOS compatible. Optional multi-network interface now available.



microWriter™ Printer
Now Under \$500.

An entry-level, laser-quality printer for small businesses and home users. 300 dpi, 5 pages per minute. Windows/DOS compatible. PS 23 model adds 23 scalable fonts & Mac™ compatibility. Now under \$700.



NEW 12ppm microLaser Pro E
Under \$1,450.

Ideal for volume intensive small work groups. 12 pages per minute, 600 dpi, Adobe Memory Booster™. Mac/Windows/DOS compatible. Optional multi-network interface now available.



8920 Forms Printer
Under \$2,600.

A heavy duty dot matrix printer for up to 9-part business forms. Adjustable 18-pin printhead, five print speeds, zero tear-off for form waste elimination. Windows/DOS compatible.



EXTENDING YOUR REACH™

**TEXAS
INSTRUMENTS**

► **S U M M A R Y O F F E A T U R E S**

	Avril-1000MD for Windows	AutoCAD for Windows	Cadence for Windows	DesignCAD 2D for Windows	Drafix CAD Professional for Windows	Drawbase for Windows Model 4000	DynaDesigner for Windows	MicroGDS
Drafting Tools (continued)								
Freehand sketching	☐	☒	☐	☒	☒	☒	☒	☐
Trims:								
Breaks	☒	☒	☒	☒	☒	☒	☒	☒
Chamfers	☒	☒	☒	☒	☒	☒	☒	☒
Filllets	☒	☒	☒	☒	☒	☒	☒	☒
User can specify radius	☒	☒	☒	☒	☒	☒	☒	☒
Cleans up intersections manually/automatically	☒	☒	☒	☐	☐	☒	☐	☐
Supports endpoint joins	☒	☒	☒	☒	☒	☒	☒	☒
User can extend line	☒	☒	☒	☒	☒	☒	☒	☒
Built-in 3-D modeler	☐	☒	☒	☐	☐	☐	☐	☒
Supports extension lines	☒	☒	☒	☒	☒	☒	☒	☒
Supports leaders	☒	☒	☒	☒	☒	☒	☒	☒
Supports rotated text	☒	☒	☒	☒	☒	☒	☒	☒
Supports tolerances	☒	☒	☒	☒	☒	☒	☒	☐
Supports absolute coordinates	☒	☒	☒	☒	☒	☒	☒	☒
Supports relative coordinates	☒	☒	☒	☒	☒	☒	☒	☒
Has built-in symbol libraries	☒	☒	☒	☒	☒	☒	☒	☐
Can access external symbol libraries	☒	☒	☒	☒	☒	☒	☒	☒
Annotation								
Includes arrowheads	☒	☒	☒	☒	☒	☒	☒	☒
Creates/imports hatch patterns	☐	☒	☐	☒	☐	☒	☒	☐
Supports solid fill	☐	☒	☐	☒	☒	☒	☒	☒
Changes colors by layer/entity type	☒	☒	☒	☒	☒	☒	☒	☒
Supports text annotation	☒	☒	☒	☒	☒	☒	☒	☒
Supports digitizer	☐	☒	☒	☒	☒	☒	☒	☐
Data file import/export:								
ASCII	☐	☒	☐	☒	☒	☒	☐	☒
.DBF	☐	☒	☒	☐	☐	☐	☐	☐
.WK1	☐	☐	☐	☐	☐	☐	☐	☐
.XLS	☐	☐	☒	☐	☒	☐	☐	☐
Performs SQL queries	☐	☒	☒	☐	☐	☐	☐	☐
Can serve as GIS front/back end	☐	☒	☐	☐	☐	☒	☐	☒
Documentation and Support								
On-line help	☐	☒	☒	☒	☒	☒	☒	☒
On-line tutorial	☐	☐	☒	☐	☐	☐	☐	☐

concentrate on improving drawing tools and external database links (as opposed to on-board database functionality) for this product to be competitive.

Ditek International

● **DynaDesigner for Windows**

BY BRYAN M. WINTER

With a powerful range of commands and a modular program structure, Ditek International's \$399 DynaDesigner (along with its 3-D counterpart DynaCADD) offers an inexpensive Windows-based alternative to

expensive and cumbersome CAD packages. Priced for retail markets instead of the now-obsolete VAR channel, DynaDesigner is in competition with a number of less expensive but high-performance CAD packages.

Among the many sophisticated features that come with DynaDesigner is the ability to sketch out rough architectural designs accurately. DynaDesigner uses its Inference Engines to lock onto critical geometry points, such as center, mid-points, and intersections, while the entity-trap cursor moves over them. This feature makes general geometric construction

faster since objects can be created on the fly. The snaps were especially useful in architectural drawing testing, where dimensions could be snapped into place without having to find a separate command to lock to the intersection. A permanent overview window allows the user to view dynamically whatever section of the drawing he or she is working on. In addition, architectural designers will be pleased with DynaDesigner's Undo command (limited only by the last save) and strong suite of editing commands and filters.

The .DXF import ability is equally superb, bringing in not only the vectors, but

MicroStation for Windows NT	MicroStation PC	PJ2 CAD System	TrueCAD for Windows	TurboCAD for Windows	Ultimate CAD Base	Vellum
☐	☐	☐	☐	☐	☐	☐
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒	☒

The DynaDesigner interface features an impressive customizable menu structure that uses a menu-customization system, called the Interactive Development System (IDS). The IDS starts with a com-

Despite its myriad strengths, DynaDesigner is not without its weaknesses. The system has a habit of crashing. The instability became apparent in our testing when we tried to fillet a corner. Additionally, the package cannot extract text from attributes. Nor is DynaDesigner a speed demon. On our Radial Copy and Rotate test, its

	Power	Ease of Use
Architectural drawing	EXCELLENT	GOOD
Mechanical drawing	GOOD	GOOD
Workgroup support	POOR	POOR
Data management	POOR	POOR



Announcing Micrografx Designer™ Technical Edition. The best thing next to CAD.

It's amazing how much time you can save, just by having the right tools. So rather than use your CAD system for initial designs, presentations or documentation, use our new **Designer 4.1 Technical Edition**. It's got everything you need for technical illustration. And none of the frivolous things you don't need.



Precision Tools.

29 specialized tools make quick work of everything from sketches to detailed drawings.



Powerful Presentations and Output.

Use the full function slide show utility to create high impact presentations.

Fully Compatible.

Designer TE comes with 40 import/export filters (including .DXF, IGES and PageMaker 5.0).

Intuitive Interface.

Customize the toolbar with your most frequently used commands. The floating hint line and the context-sensitive "Help" give you constant feedback on what you're doing.

Pass your files to and from your CAD system with ease *and* reliability. Design with precision as tight as 1μ. Create eye-popping presentations and detailed documentation. And do it all in a *fraction* of the time you're spending now. Hard to believe? Then call us on it. **1-800-894-6599**. We'll send you a 30-day trial copy on CD-ROM. *Free.**

We've also got a fantastic deal for those of you who own an earlier version of Designer.

Micrografx Designer 4.1 Technical Edition. Don't do CAD without it.



MICROGRAFX®

1 - 8 0 0 - 8 9 4 - 6 5 9 9

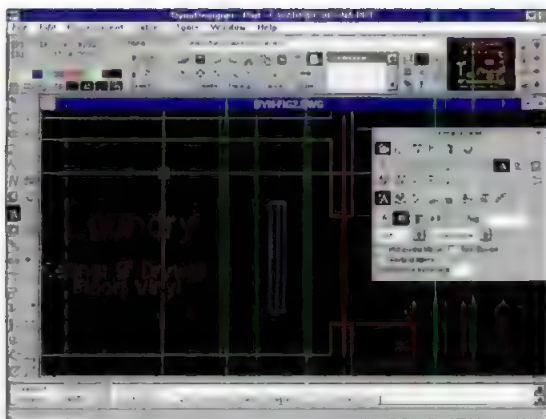


*Offer expires 3/31/95. There is a nonrefundable \$7.50 shipping and handling charge. Copyright© 1994 Micrografx, Inc. All rights reserved. 214-234-1769.

CIRCLE 230 ON READER SERVICE CARD

GRAPHICS

2-D CAD Software



DynaDesigner's Command Panel offers a floating command menu source and a wealth of heads-up info. Among the package's many sophisticated features is the ability to sketch out rough architectural designs with accuracy.

score was the third slowest of the bunch.

The package is targeted more toward individual users than workgroup environments. It can be run from a server, but without file locking or reference files. And while database links can be written in IDS, the package does not support DDE and would be of limited use for high-end applications such as facilities management or multidisciplinary architectural work.

DynaDesigner is an impressive drafting package that offers a powerful but somewhat kludgy toolkit useful for a wide range of drawing tasks. It could not complete every task in our evaluation, but it may be an affordable alternative for people who need a good precision drawing tool.

Graphic Data Systems Corp.

● MicroGDS

BY WILL SCHLETER

The cost-conscious PC CAD buyer will notice right away that MicroGDS, Version 3.2, is not a low-end package. Graphic Data Systems Corp.'s \$3,250 program targets the architectural and geographical information services (GIS) markets with a comprehensive, customizable system tailored to working with large projects. Utilizing the Microsoft Windows operating environment to its fullest, MicroGDS is a network-ready solution integrating first-rate data-management capabilities into an object-oriented CAD system.

The installation of MicroGDS hints at two fundamental concepts of the product.

By including Microsoft's Win32 libraries, MicroGDS readies itself for the inevitable migration to Windows 4.0 and Windows NT. The libraries allow MicroGDS to run as a 32-bit application in the 16-bit environment of Windows 3.1. Second, the installation provides you with both single- and multiuser versions. In the multiuser version of MicroGDS, the file-management structure allows different parts of a project's data to be accessed by different people. MicroGDS requires a parallel-port hardware lock to be on the local machine or on a network server, with the latter arrangement al-

lowing licenses to be shared by all machines on the network while limiting the number of simultaneous users.

When you start MicroGDS you'll immediately notice its dynamic cursor. The cursor provides superb hinting for object snaps by constantly changing to identify the closest snap point. In the top portion of the main window, you find a toolbar and prompts, while a single line of view-selection icons and a zoom scrollbar occupy the bottom portion of each drawing window. Although MicroGDS evolved from and directly interfaces with a workstation-based package known as Graphic Data System (GDS), it was rewritten from the ground up to take advantage of Windows. MicroGDS represents one of the best technical implementations of Windows functionality we've seen by fully supporting cut-and-paste, dynamic data exchange (DDE), and object linking and embedding (OLE) capabilities.

NOT LIKE THE REST

MicroGDS doesn't fit the mold of traditional "drawing board emulator" CAD systems. Its object-oriented approach to CAD requires you to think ahead and plan your work, resulting in more organized and usable data. Neither could you categorize it as easy to learn—you can't stumble through the menus and learn simply by trial-and-error. The reference manual doesn't provide much help with the basics, nor does it provide any tutorials or examples. On the plus side, context-sensitive on-line help is available for most

commands, and training and technical support for MicroGDS are available through authorized distributors.

MicroGDS was not designed for—and thus is not suitable for—mechanical designs such as our sample gear drawing. Surprisingly, tools tailored for architectural drafting were also missing and made constructing our floor plan more difficult than we expected. But MicroGDS's power in combining CAD with data-management capabilities was evident when it came to attaching attributes to objects and extracting the data from a drawing. Finally, performance on our timing tests was slightly above-average compared with the other products we tested.

The current version of MicroGDS maintains 3-D information for all geometry, but supports only wireframe displays for the viewing of this information. Version 4.0, due out by the end of September, will have built-in rendering and will allow control of object materials and lighting characteristics.

Two different methods for creating custom utilities for MicroGDS are available. A dynamic link library (DLL) for custom applications provides a set of routines for accessing and modifying data in a

► FACT FILE

MicroGDS, Version 3.2

List price: \$3,250 **Requires:** 386-based PC or better, 4MB RAM, 30MB hard disk space, math coprocessor, Microsoft Windows 3.1 or later. **In short:** MicroGDS fully utilizes the Windows operating environment to provide workstation-based CAD capabilities on the common and affordable PC platform. Its data-handling abilities and speed are above-average. Yet the program is not really suitable for mechanical designs, and it lacks some architectural drafting tools. And it can't approach AutoCAD's third-party add-on support, although GDS does prnd itself on creating customized solutions for customers

Graphic Data Systems Corp., 6200 South Syracuse Way, #250, Englewood, CO 80111, 800-678-4120, 303-741-8484, fax, 303-741-8456

473 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	FAIR
Mechanical drawing	FAIR	FAIR
Workgroup support	EXCELLENT	GOOD
Data management	EXCELLENT	GOOD

• CAD for Now and the Future

By Joel N. Orr

Several CAD products were still in beta during our testing process, so we were not able to review them formally. While some of these packages are evolving slowly and steadily—by implementing Windows and offering programmability, for example—others are making strides in a much more revolutionary direction. What should you expect down the road? Look for client/server networking, object orientation, and not least of all, more high-end features in low-cost CAD products.

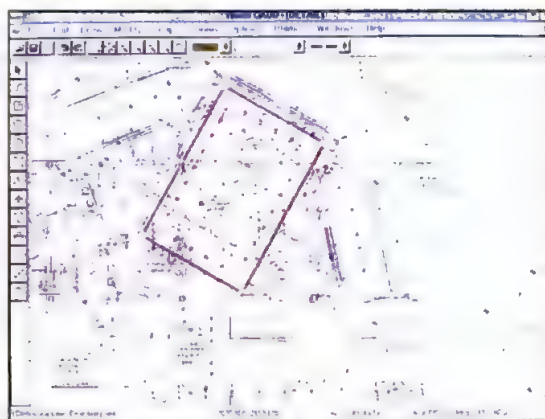
• AutoCAD Release 13

Autodesk is wrapping up work on the long-awaited Release 13 of AutoCAD, the world's most popular CAD program. But because of its need to preserve compatibility with the million or so existing users, its development is taking longer than anyone expected and it is a far less radical upgrade than Release 12 (and than had been originally predicted). The main improvements are invisible to the end user, and affect mostly internal file structures. But there is a real commitment implicit in this product to GUI interfaces, integration with other applications through the implementation of technologies such as OLE, and programmability. The package also includes support for precise solids and associative hatching, as well as wider support for a number of platforms, including Windows NT.

• Visual CADD

Speaking of Autodesk, when the company decided to close its Bothell, Washington-based Generic CADD office, the programmers formed Numera Software Corp. Numera has announced Visual CADD for Windows, which, were it still owned by Autodesk would probably have been Generic CADD for Windows. Not

only is it compatible with the two-letter commands of Generic CADD, but it is also an open system. The \$495 product (\$195 for the upgrade) is an extraordinarily competent CADD program and an excellent Windows implementation. Subtleties abound: "Help" windows and dialog boxes do not cover the drawing area, for example. The company is encouraging developers to write applications for



A clean look and lots of room for the drawing are the goals of Visual CADD's designers.

the package and is getting an audience. Visual CADD should be shipping by the time you read this.

• Cadkey 7 Windows

Also expected out is the \$495 Cadkey 7 Windows, from the company that first popularized 3-D CAD on the PC. It will have the same features as Cadkey 7 for DOS and will include Cadkey LISP, whose purpose is to facilitate the porting of AutoCAD add-on AutoLISP packages to the Cadkey environment. Cadkey stands on the cusp between evolution and revolution: The Cadkey Object Developer, CODE, is a modular, object-oriented framework for developing CAD applications in the Windows and NT environments.

• Liberator

The CAD revolution has its most nearly full-featured manifestation in

Computervision's new Windows product, code-named Liberator. Conceived and managed by Ron McElhaney, Liberator embodies all the CAD industry's buzzwords: solids, non-manifold representation, object-orientation, constraint management, parametrics. Liberator can even read existing .DWG (native AutoCAD) files and turn them into parametric models. The package is designed to function securely in large networks. Computervision plans to price it at or under AutoCAD's price. The first release is wireframe only; the internal structure for full solids is built in, but the user-level manifestation of this feature will come later.

• XCAD

Although touted as the next generation of 3-D CAD software for Windows, Xitron Software Corp.'s \$495 XCAD is now being marketed as a 2-D and 3-D CAD program with a feature set that rivals that of AutoCAD LT. It is

a rather attractive Windows (16-bit) and Windows NT (full 32-bit) 2-D CAD product with very strong 3-D capabilities. But we could not include it in our roundup because it lacks a macro language. The good news is that version 3.0 will add a macro language along with other enhancements and should be available by the time you read this.

• CAD X11

GreyTech Software's CAD X11 represents yet another important direction—that of automatic feature creation. This product began in the Unix world and has migrated to a couple of different platforms. It is now about to be released as a good Windows citizen. CAD X11 creates gears and other items from simple user entries. While still very rough, this product shows promise. □

Revolutionizing an industry happens once in a lifetime. Okay, maybe twice.



COLOR LASER COPIER 800

When the world asked for color, Canon responded with the revolutionary Color Laser Copier. Now Canon is answering today's color needs with a visionary new generation of color solutions, the Canon Color Laser Copier 800 and 700.

This new breed of copiers produces images so sharp, so vivid, they're virtually indistinguishable from the original. And Canon's new copiers are highly productive, too.

They make a swift seven full-color copies per minute on a variety of materials including card stock.

Auto-feed OHP transparencies efficiently by cassette. Make multi-page documents effortlessly with the optional Recirculating Document Feeder and Sorter. And the Color Laser Copier 800 is the first color copier ever to offer *Auto Duplexing* for automatic two-sided copies.

You can also transform these new color copiers into ultrafast, full-color, plain paper printers with optional print controllers and Intelligent Processing Units (IPUs), so you can make brilliant color output directly from your computer or network.

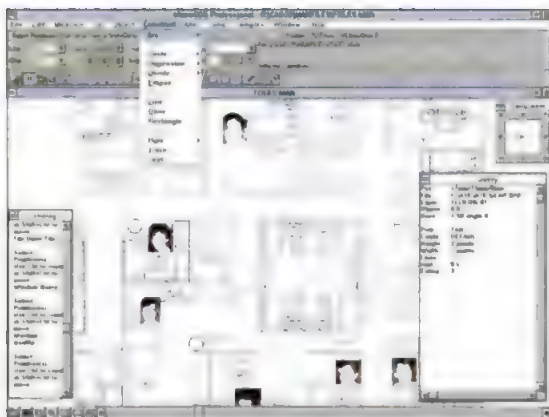
For a free *Color Solutions Guide* that will tell you more about the new Canon Color Laser Copier 800 and 700, as well as the rest of our color copier line, call 1-800-OK-CANON. When the rest say you can't, Canon says you can.

N O W
Y O U
C A N

Canon

GRAPHICS

2-D CAD Software



MicroGDS's strength lies in its ability to manage vast amounts of different types of data for large projects. The wide array of informational and tool windows can be enabled or disabled as desired.

drawing by interfacing with a running copy of MicroGDS. A file-access DLL provides direct access to the MicroGDS drawing file structure. Even with these capabilities, MicroGDS does not have the magnitude of third-party support that AutoCAD or MicroStation enjoys. In fact, GDS thrives on providing complete, customized solutions for its customers.

MicroGDS fully utilizes the Windows operating environment to provide workstation-based CAD capabilities on the common and affordable PC platform. But you probably don't need to consider this expensive package as a solution to your CAD needs unless you plan on making a commitment to a customized solution that utilizes MicroGDS for managing all of the data associated with large projects.

Intergraph Corp.

● MicroStation for Windows NT

● MicroStation PC

BY ALAN D. SMITH

In any close race, you can usually hear the footfalls of your nearest opponent. AutoCAD has, since 1986, been steadily paced by MicroStation, first on the DOS and Unix platforms, and now, with Version 5, on Windows and Windows NT. And while Intergraph Corp.'s \$3,790 MicroStation may not be the fastest of the bunch, its included features are top-notch and may even surpass those of AutoCAD, barring that product's many third-party add-ons.

MicroStation is at home with both mechanical and architectural design, offering prefab symbols and stored file settings for both applications. As such, it handled our test drawings with aplomb. Its ability to store a variety of settings and files in a feature called Workspaces is of great value for multidisciplinary firms. In addition, MicroStation's add-on library is comparable with that of AutoCAD, and the package has a number of native features that AutoCAD can only claim as add-ons.

MICRO-STATIONED

The only surprise with installation was that the version we used for Microsoft Windows 3.1 is actually a DOS version with the Windows Connection interface: The software installs from DOS and requires a connection to Windows through the company's own add-on utility. Once installed, a MicroStation PC group is created in Windows and all system interaction is thereafter Windows-based and resembles that of MicroStation for Windows NT almost completely.

While the fact that MicroStation PC installs in DOS and runs in Windows may not be an issue by itself, performance tended to suffer with the Windows Connection. MicroStation for Windows NT is a true NT-based program that worked competently in our testing. Overall, both MicroStation packages were average performers on the majority of our performance tests. But both suffered considerably on the Radial Copy and Rotate test.

INTERFACE OVERKILL

MicroStation's user interface suffers a bit from icon overkill. It includes the drawing window called Views (users can open up to eight windows for multiple views of a 3-D object), the Command Window that includes a status area, tear-off tool palettes, and the Tool Settings box.

Creating accurate geometry is a little confusing. Precise options for many elements, such as line angle and circle radius as well as color value, are not part of the immediate icon options that are displayed when a tool is selected, unless an option is placed on a tear-off tool palette. Still, all

options for a selected tool do appear in the Tool Settings box.

Yet MicroStation's interface quirks are outweighed by its innate power. You can create custom line styles. The method is completely graphically oriented, with controls for stroke pattern, gap and length of line segment, and repeatability. There are other graphical shapes and multiple lines. The text editor, which supports multiline paragraphs, is also well thought out.

While many products offer symbol libraries, MicroStation goes a step further with *cells* (the company's term for symbols). Cells are created in their own window and can be viewed and handled while you continue to work in the current file. Few other CAD products allow for such

▶ FACT FILE

MicroStation for Windows NT, Version 5

MicroStation PC, Version 5

List price: \$3,790 **Requires:** MicroStation for Windows NT: 386-based PC with math coprocessor or 486-based PC, 16MB RAM, 14MB hard disk space, Microsoft Windows NT 3.1 or later. MicroStation PC: 386-based PC with math coprocessor or 486-based PC, 8MB of RAM, 14MB hard disk space, Microsoft Windows 3.1 or later.

In short: While MicroStation PC uses Windows extensions to run under Windows 3.1, MicroStation for Windows NT stands as one of the few true Windows NT CAD products. As such, it has a powerful set of features, including strong data-management, dimensioning, and network abilities that will surely satisfy any 2-D CAD professional. As its add-on library grows in stature and Intergraph Corp. address some key speed issues, MicroStation for Windows NT may be poised to give AutoCAD for Windows a run for its money.

Intergraph Corp., Huntsville, AL 35894-0001, 800-345-4856, 205-730-2000, fax, 205-730-2108

474 on reader service card

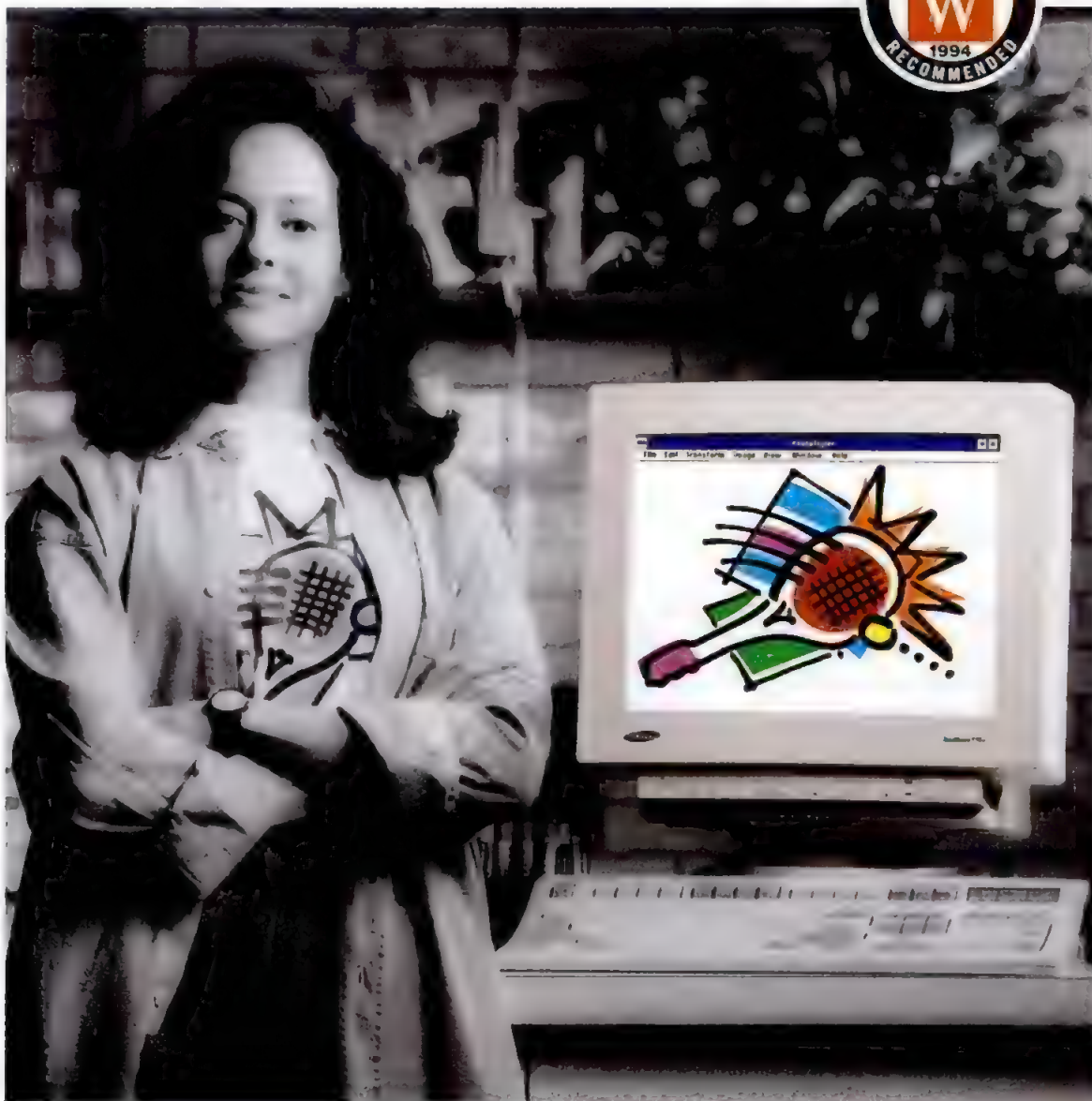
SUITABILITY TO TASK (WINDOWS NT)

	Power	Ease of Use
Architectural drawing	EXCELLENT	EXCELLENT
Mechanical drawing	EXCELLENT	EXCELLENT
Workgroup support	EXCELLENT	GOOD
Data management	GOOD	GOOD

SUITABILITY TO TASK (PC)

	Power	Ease of Use
Architectural drawing	EXCELLENT	GOOD
Mechanical drawing	EXCELLENT	GOOD
Workgroup support	EXCELLENT	GOOD
Data management	GOOD	GOOD

Samsung A new point of view.



SyncMaster 17GLs

It's about how you work...Attitude. Satisfaction. Pride. The 17-inch SyncMaster™ monitors reflect today's changing lifestyles. Hassle-free. Value-oriented.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about safety and energy conservation, so they're standard on the whole series. Life should be as simple as possible, so we added



SyncMaster	14GL	15GL	17GL	17GLs
CRT Size	14"	15"	17"	17"
Dot Pitch	28	28	28	28
Maximum Resolution	1024x768	1024x768	1280x1024	1600x1280
Maximum Refresh Rate at Maximum Res. (Hz)	75	75	60	60
MPR-II (Low Radiation)	•	•	•	•
Power Management	•	•	•	•
Flat Square Screen	•	•	•	•
On-Screen Programming	•	•	•	•
Real Color Control	•	•	•	•
Warranty	2 Years	2 Years	2 Years	2 Years

*1994 Samsung Electronics America Inc. The EPA Energy Star logo is not to be considered a product endorsement. Image on SyncMaster 17GLs courtesy of Miller Quon Design Office

innovative new features like On-Screen Display and Real Color Control, and as you would expect, the GL Series comes with a two-year limited warranty.

Think about how you view your work. Samsung did. And came up with a whole new point of view. For additional information, call 1-800-444-8962.

TECHNOLOGY
THAT WORKS
FOR LIFE



Fax-on-demand System now available for product specifications 201-229-4053

CIRCLE 048 ON READER SERVICE CARD

interaction with the stored symbol attributes within the main application.

MicroStation's data management is also strong; you can edit the field-delimited element "tags" attached to objects or entities. All changes are automatically stored with the drawing file. The program also let us easily generate reports on tag files connected to our test drawings.

Support for associated hatching offers better performance than we anticipated. When a hatch is associated with a border, changing the border will cause the hatch to be recalculated and fill up the new area. For instance, when we resized the geometry in the cross-section of our mechanical drawing, the hatching resized as well.

MORE DIMENSIONS

MicroStation's dimensioning functions are very good. Not only is there control

is being mentioned in the same breath as AutoCAD. And with its high-performance features, such as associated hatching, dimension-driven design, viewable cell libraries, high-end rendering and 3-D capabilities, a custom line editor, and intelligent workgroup performance, maybe it's time to mention MicroStation—and particularly the NT version—first.

CadWare s.r.l.

● Pj2 CAD System

BY ALAN D. SMITH

When we last looked at CAD products, Pj2 CAD System was on the verge of being translated from Italian into English. It has since finished its transatlantic journey and now holds the honor of being one of the only OS/2-based CAD products on the market today. Unfortunately, that may

be Pj2 CAD, Version 3.1's only honor. While it offers a very nice user interface, it suffers from a "lost in translation" syndrome. A mix of nonstandard English menu terms, a reliance on keyed-in commands, and mediocre documentation make the package rather complicated.

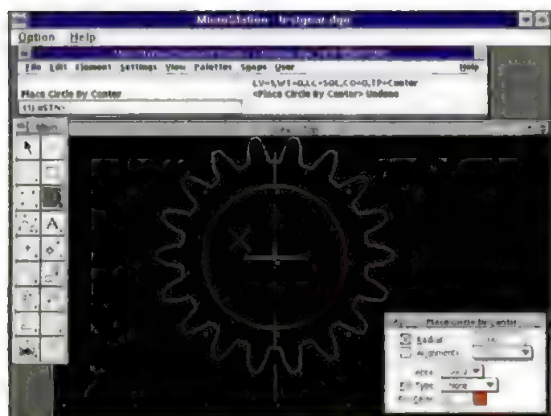
A basic problem was revealed to us in the \$1,500 program's installation process, which is otherwise straightforward. The documentation reports that a three-button mouse is required to get full functionality of all the menus and icon palettes. For example, on-line help is available for the tablet

screen is divided into two sections, one for a key-in command area, the other for status information such as coordinate location and current commands. With all of these tools at hand, the user has myriad options for controlling the system.

The screen tablet, displayed along the right side of the screen in its own window, consists of a set of often-used subicons—object-snap icons, text-command buttons, color settings, and linetype icons—and main icons for drawing, dimensions, blocks, splines, and help. Unfortunately, this window is displayed over the top of the drawing area, and the drawing area window does not automatically resize to allow for this overlap.

This brings us to Pj2 CAD's basic failing: While performing simple functions, such as creating lines, arcs, and circles, is easy with this product, figuring out complex commands is much more difficult. You must read and decipher the manuals extensively before you can begin to make sense of such commands. There is on-line help, but in our evaluation, it wouldn't respond to anything other than a three-button mouse.

You choose simple snap locations, such as centerpoints or endpoints, via an easy-to-find snap icon in the screen tablet area.



MicroStation's cluttered screen is offset by the package's long list of features, options, and system controls. The package offers prefab symbols and stored file settings for both mechanical and architectural designs.

over type, but settings such as text location and orientation may be retrieved from a stored group of architectural or mechanical standards such as ANSI (American National Standards Institute) or JIS (Japan Industrial Standard).

Among the best workgroup performers we saw, MicroStation effortlessly shares files among its DOS, Macintosh, Unix, Windows, and Windows NT versions. Moreover, the package provides tools to create an organized CAD system with consistent configurations across all user sites. Its file locking and simultaneous user licensing (network license sharing) reduce the implementation costs.

More than ever before, MicroStation

menu, but with our two-button mouse arrangement, we could not access it. There is a setup option for switching mouse button functions to get the same control with a two-button mouse, but it did not work.

At the outset, Pj2 CAD appeared to be easy to use. In addition to pull-down menus, the product offers key-in commands, a great pop-up icon layout with memory of the most recently selected icon, and a very complete screen tablet. Along the top of the screen are eleven pull-down menu commands: Archive, Env (environment), Flags, System, Grid, Macro, Selend (selection end), Undo, Backward, Forward, and Command (command end). The bottom of the

▶ FACT FILE

Pj2 CAD System, Version 3.1

List price: \$1,500 **Requires:** 386-based PC or better, 8MB of RAM, 10MB hard disk space, math coprocessor, so/2 2.0 **In short:** As one of the few OS/2 choices available to CAD professionals, Pj2 CAD System is something of a disappointment. A mix of nonstandard English menu terms, a reliance on keyed-in commands, and mediocre documentation make the package rather complicated. The product is poorly translated from the Italian version; the interface, users' manual, and functionality need to be improved before any CAD user should consider Pj2 CAD System.

CadWare s.r.l., U.S. Distributor, Indelible Blue Inc., 3209 Gresham Lake Rd., #135, Raleigh, NC 27615, 800-776-8284, 919-878-9700, fax, 919-878-7479

475 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	FAIR	FAIR
Mechanical drawing	FAIR	POOR
Workgroup support	N/A	N/A
Data management	FAIR	FAIR

But finding out how to select multiple objects by defining a selection window area (or *trap zone*, as it is sometimes called) for our array test was much harder. Pj2 CAD's Szone (Selection Zone) command required a great deal of trial and error before we could get it to operate properly.

There were more complications. For example, the software could not perform a fillet on the left side of the gear tooth to the inner diameter of the hub. Performing the command *fillcomp*, which gives all possible fillet combinations, displayed all but the correct arrangement. Moreover, when we invoked the Backwards command, which is essentially an Undo command, the system locked up.

Crosshatching worked well for the cross-section part of the drawing. If you simply select one line that represents a boundary, the package provides the required closed area and fills it with the hatch pattern. Pj2 CAD doesn't support double lines in architectural drawings and, even worse, works only in absolute units; in other words, you set the measurement unit, which makes other adjustments such as dimensioning more difficult than necessary.

In order to perform plotting, we had to save a .DXF file in Pj2 CAD, exit the application, and launch the plot facility from the Pj2 CAD window. The plot facility provides the plot scale and the controlling plotted layer, along with pen and color assignments, rotation, and point size.

Pj2 CAD looked exciting right out of the box and even outperformed some of the market leaders on our performance tests. But we were soon disappointed to find that commands were hard to figure out and that several functions did not work. Overall, more work needs to be done to make Pj2 suitable for the English-speaking market.

Choice Computing

• TrueCAD for Windows

BY WILL SCHLETER

If you think CAD stands for Complicated And Difficult, then the \$295 TrueCAD for Windows, Version 2.10c, from Choice Computing, is misnamed. TrueCAD combines a clean and efficient Microsoft Windows interface with a well-designed core graphics system. While limited in some areas, TrueCAD fits the bill as an

easy-to-use, versatile, and low-cost Windows CAD package.

Getting started with TrueCAD is made easy by a down-to-earth "Things You Should Know" section at the beginning of the users' manual. This section pulls all pertinent details out of the reference sections of the manual and puts them in one easy-to-find place.

A set of simple tutorials in the manual will help get you up to speed quickly and easily. On-line help, while not context-sensitive, mirrors most of the information in the manual. And if these resources fail you, Choice Computing provides free technical support for registered users.

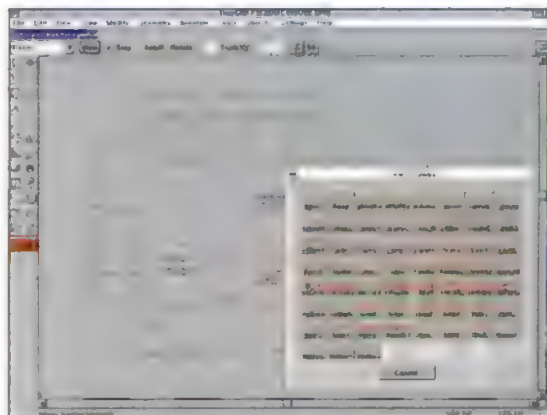
TRUE EASE

Using TrueCAD is a pleasant experience; functions are logically arranged and intuitive. TrueCAD successfully combines the simplicity of a paint program with the accurate drawing tools of a CAD system. Objects can be moved, rotated, and scaled by grabbing the entity handles and dragging or by entering the relative movement from the keyboard. For example, to move a line accurately without making a single menu pick, you select the line, press an arrow key to specify the direction, and then enter a distance. Double-click any object to change its properties. Rubberbanding—the ghosting of objects as you move or stretch them—is excellent, always showing you what the result of an action will be in advance.

Behind the scenes, TrueCAD is driven by textual commands. All interactions map to these commands, and since a single external file contains all of the menu, toolbar, and keyboard shortcut definitions, this structure allows you to customize any of these easily by editing a single menu-definition file. In addition, you can combine the commands with the product's BASIC-like macro language to define your own functions. For the ultimate in customization, Choice Computing markets the graphics engine used in TrueCAD as a Visual Basic control, thus providing a powerful tool to assist software developers in creating systems built upon the capabilities of a CAD system.

SYSTEM'S SECRETS

TrueCAD's main window is surrounded by a menu and prompt area at the top, a toolbar along the left edge, a status area with cursor help and coordinate display along the bottom, and a color-selection area in a narrow strip along the right edge of the screen. A right click of the mouse on the drawing area accesses the floating toolbar. Each toolbar button has two functions accessed by either a left or right



TrueCAD lets you select and position symbols easily.

Options for rotating, scaling, and mirroring are all readily available, and a rubberbanding feature provides previews of symbols as they are placed on-screen.

click of the mouse. As the cursor moves over an icon, a description of the functions is provided in the status area at the bottom of the screen.

Although TrueCAD does not let you view more than one drawing at a time, it does allow multiple views of a single drawing file. TrueCAD makes the most of the graphical Windows interface, supporting TrueType fonts and all Windows-supported input and output devices, but it has no OLE integration.

Our test drawings brought several of TrueCAD's interesting features to light. Creating the geometry for the gear was no problem, but we couldn't achieve the desired look for the dimensions because the only dimension style available in TrueCAD is one that places text above and parallel to (or below and parallel to) the dimension line. Modifications to the gear using stretch and scale worked well.

In the test floor plan, the interface for placing the door and window symbols was outstanding. The package provides a special toolbar with options for obtaining a visual list of the symbols, rotating the symbol

Computers

CompuDyne 4/210 DX2/250 #018005 ... 1,149.99
CompuDyne DX2/66 Minitor II/420 1,599.97
#018014
CompuDyne Pentium MM MT #018583 ... 2,199.99
CompuDyne DX2/66 Desktop 4/420 ... 1,299.99
#018371



**Guaranteed
Low Prices**

CompuDyne 4/420 DX2/250 #018032 1,299.99
Compaq Presario 860 CDS SX2/66 MM MT
#322511 ... 1,896.97
CompuDyne SX33 4/210 #312951 ... 899.99
Pack Bell P60 Pentium MT 8/420 MM ... 2,199.99
#487830
Pack Bell P/90MHz Pentium 8/810 ... 2,699.99
#483335
Pack Bell DX2/66 MM MT 8/720 ... 1,899.99
#477825
Pinnacle P60 Pentium MM MT 8/425 ... 1,999.99
#497983

Business Systems

Apple-Power Macs Call
AST-Ascendia, Bravo, Promina Call
Compaq-Prolinea, Desktop, Elite, Prolinea,
Prosignia Call
IBM-PS2, Valuepoint, Thinkpad Call
Toshiba, 4000 Series Call
Dell Dimension Call

Notebooks

Compaq Aero 4x133x 4/170 MB ... 1,999.99
#297164
Epson AM 500x 4SLC 2/50 4/260 ... 1,899.99
#278174
Epson AM 486 SLC 2/50 4/260 ... 1,499.99
#489590
NEC Versa DX2/40EC 4/250 #260381 ... 3,879.99
NEC Versa SL-33 4/210 #475042 ... 2,449.99
TI TM4000E Win 8X2/50C 4/200 ... 3,779.99
#420554
TI TM4000E Win 8X4/75 4/340 ... 3,999.99
#295391
Toshiba T1910SL/33 4/200 #297481 ... 1,639.99
Toshiba T1910CS SX/33 4/200 ... 2,229.99
#297432
Toshiba T1960CS #421813 ... 2,499.99
Toshiba T1960CT #421804 ... 3,249.99
Toshiba T2400CS4/250 #490445 ... 3,199.99

Monitors

Compaq 14" SVGA .28 MI 800 ES ... 396.97
#247575
CompuDyne .39 14" mm dp #976741 ... 219.99
CompuDyne 14" .28 MI #298481 ... 279.99
CompuDyne 15" .28MI FS #284690 ... 359.99
IBM 14" .28 MI #235034 ... 399.97
NEC 14" 2V.28MS #414092 ... 349.99

NEC 3V ES, 15" .28 mm dp #216135 ... 479.99
Nokia 15" .28 MI FS Trinitron #475015 ... 569.99
Nokia 17" .25 MI Trinitron 1280 #474944 ... 989.99
Nokia 17" .25 MI Trinitron 1600 ... 1,169.99
#474953

Printers

Canon BJ10SX Printer #257351 ... 249.99
Canon BJ200E #274103 ... 5289.97

Cards

Networking

3Com Etherlink III 10BaseT #530580 ... 129.99
Artisoft LANtastic 6.0 Software 1 User ... 89.99
#301491
Focus AAUI Transceiver 10 BT #265741 ... 49.99
GVC Coax 16 Bit Eth Adap. ... 59.99
Software Selectable #286121

Modems

Heyes Accura 288 V.R.+Fax #279335 ... 299.99
Intel 14.4/14.4 Fax/Data PCMCIA ... 239.99
#246291
Magahurtz Xjack 14.4 w/ Fax PCMCIA ... 249.99
#947981
Prac Paraph 14.4/14.4 Mini-Tower II ... 139.99
#323282
US Robotics 14.4 Mac-M-Fax #525872 ... 169.99

Increase your buying power.

Now, you can take advantage of the buying power of America's largest computer superstore, backed by the strength of 78 stores nationwide. Nobody offers a bigger selection or more name brands than CompUSA DirectSM. And we pass that buying power along to you - with guaranteed low prices on everything we sell*. You won't get all this from any other direct company. So make the right call, to 1-800-CompUSA.

Canon BJ-C600Color #214404 ... 556.97
Citizen Notebook Printer II #245390 ... 299.99
Epson ActionLaser 1500 #945482 ... Call
Epson Color Stylus #359793 ... Call
HP LaserJet 4+ #216044 ... Call
HP LaserJet 4L #945741 ... 599.99
After \$50 Mail-in-rebate
HP LaserJet 4P #226044 ... Call
Okidata OL400E Laser Printer #214235 ... Call
Sharp JX 9400 #324394 ... 489.99
Tektronix Phaser 220E #316045 ... 3,994.99

GVC Pocket ETH TP & BNC Adapter 10 BT 159.99
#279460
GVC PCMCIA Combo Eth. Adap. TP & BNC 189.99
#501814
Novell Personal NetWare 3.5* #267311 ... 69.99
SMC Eth 16 Combo Adapter #42192 ... 149.99

Graphics Cards

Diamond Stealth 64 VLB 2MB #47574 ... 399.99
STB Lightspeed VLB #257322 ... 159.99



ask about our
**3 Year
Service Plan**

US Robotics Sportster 14.4 Int w/ Fax ... 129.99
#525843
Digicom 14.4+Fax w/19.2 upgrade ... 79.99
#274773



**Custom
Configuration**

Multimedia

Speakers

Addison Technology Spkrs #947743 ... 17.99
Altec ACS-300.1 #286722 ... 299.99
AR Powered Partner 22 #948292 ... 89.99
Jensen JPS-45 #477654 ... 149.99
Lohtec CS-800 #94665 ... 42.99

Video

Reveal Radio Card #94753 ... 49.99
T Vutor VGA to TV Adapter #251184 ... 299.99
VideoLogic 928 Movie ISA #308170 ... 299.99

Audio

Gravis Ultrasound Max WaveTable ... 199.99
#425141
MediaVision Premium 3D Mod ... 159.99
#435163
Sound Blaster 32 AWE #302174 ... 299.99
Sound Blaster 16 Value #338472 ... 99.99

Kits/Drives

Apple Multimedia Kit #356794 ... 449.99
CompuDyne 2x CD-ROM drive ... 129.99
#308900
NEC Multispin 3XE #232852 ... 399.99
Creative Labs GameBlaster CD16 ... 399.99
#295371
Reveal Wave Kit w/35 Titles #94742 ... 599.99
Sony Multimedia Kit #335961 ... 299.99
Toys Super Quad 4X #477601 ... 429.99

Accessories

APC400 Backup UPS #833192 ... 179.99
Chicony 101 Key Keyboard #245141 ... 19.99
HP Hi-capacity Inkjet Cartridge #481661 ... 24.99
Microsoft Serial Mouse 2.0 #63463 ... 59.99
O'Sullivan Workcenter #887945 ... 89.99
100 3 1/2" HD/ IBM Diskettes ... 39.00
After \$10 Mail-in Rebate #318434 ... 29.00

Storage

Conner 420 MB Hard Drive #296893 ... Call
Conner 250 MB Tape Drive #233261 ... 129.99
Maxtor 345 MB Hard Drive #895721 ... Call
Maxtor 546 MB Hard Drive #301082 ... Call

Software/CD-Rom

Geomedia '94 #232760 ... 48.99
Critical Path #254584 ... 47.99

*If you find a lower price in the current issue of this magazine we'll beat it. Guaranteed. Offer good on all new in-the-box products of the same brand and model number that are available in stock from any other authorized mail order retailer. It does not apply to competitors' one-of-a-kind or other limited quantity offers or when a bonus or free offer is included in the purchase. CompUSA Direct prices are available through mail order only. Prices and specifications are subject to change without notice. We reserve the right to limit quantities. Technical support available through your nearest CompUSA Superstore Technical Service Center. On-site service is available within the continental U.S. only.

ESPN Sport Shorts #235060	21.99
Megatrux #223225	37.99
Myst #288780	47.99
Outpost #289002	37.99
Print Shop Deluxe Ensemble #499525	79.99
Star Wars Rebel Assault #254531	44.99
ReMaterial #316604	15.99
Toxi #239593	49.99
The 7th Guest #331322	42.99

Software/DOS

Communications

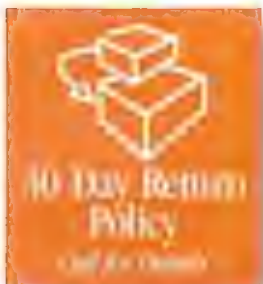
Difrax/Bitcom #181862	29.99
CompuServe Membership Kit #170451	24.99
LapLink V #163682	119.99
Microcom Carbon Copy Plus 6.1 #183394	149.99
PC Anywhere 5.0 #296753	129.99
Procomm Plus V 2.01 #169114	99.99
Prodigy Start Up Kit #181555	16.99

Upgrades

Dbase for DOS 5.0 Upgd #360073	149.99
--------------------------------	--------

Business

BizPlanBuilder #141251	89.99
Employee Manual Maker DOS/Win #169144	99.99
Managing Your Money 1.0.0 #214703	28.99
One Write Plus Accounting 4.0 #264841	49.99
Power Builder #288644	249.99



Graphics & Design

Animation Studio #393620	89.99
Home 2.0 #239325	24.99
Home Series Deck 2.0 #239334	24.99
Home Series Kitchen/Bathroom 2.0 #229314	24.99
Landscape 2.0 #225232	24.99
Print Shop Deluxe #499561	49.99
Print Shop Deluxe CD Ensemble #499525	54.99

Programming

Borland C++ 4.0 Upgrade CD-ROM #259393	197.99
Borland Turbo C++ Visual Edition #163842	79.99
Turbo C++ 3.0 #160812	79.99
Turbo Pascal 7.0 #169935	117.99

Utilities

386Max 7.0 #595163	49.99
Caché 86 5.0 Win/DOS #184632	41.99
Check It Pro Set #164100	94.99
Norton Utilities 8.0 #294835	119.99
GEOM 7.03 #166215	69.99

Spirinix III 3.1 #164020	89.99
XTree Gold 3.0 #206490	99.99

Entertainment

1942 Pacific Air War #288004	49.99
Alone In The Dark 2 #288791	34.99
Corridor 7 #222873	27.99
Comanche Max Overkill+Mission 1 #239303	47.99
Elder Scrolls: Arena #250383	39.99
F-14 Fleet Defender/DOS #280715	49.99
The Fighter #294522	44.99
Harpoon II #256491	42.99
Indy Car Racing #251435	42.99
Links 386 Pro #388104	39.99
Links Castle Pine #298511	18.99
Master of Orion #212302	42.99
Microsoft Flight Simulator 5.0 #159633	39.99
Mortal Kombat #234801	34.99
Pinball 2000 #275482	49.99
SimCity 2000 Scenario #293444	12.99
SSN-21 Snowfall #232204	42.99
Star Trek: Judgment Rites #237540	37.99
X-Wing #331022	39.99

Software/OS/2

Upgrades

IBM OS/2 2.1 Upgrade #561902	Call
Lotus SmartSuite OS/2 Upgrade #211653	279.99

Business

Footprint Works OS/2 v #277721	89.99
IBM OS/2 for Windows #229292	Call

Communications

fax/PM OS/2 #277710	99.99
Jalden CommPress #277783	59.99

Utilities

Jackmaster For OS/2 2.1 #277732	59.99
JPU Monitor Plus OS/2 #277674	79.99
HyperAccess/DOS 8.05/2 #277685	139.99
Performance 2.1 Plus OS/2 #277743	24.99
Vipout OS/2 #277663	39.99

Programming

CA Realizer 2.0-Win/OS/2 #262403	77.99
----------------------------------	-------



Software/Windows

Upgrades

Dbase For Windows 5.0 Upgd #366104	199.99
Lotus SmartSuite 3.0 #501574	279.99
MS Access 2.0/Win. Upgrade #297974	118.99
MS Office 4.2 Upgrade #281085	248.99

MS Word 6.0 Competitive #226240	128.99
PC Tools 2.0 Upgrade #285015	49.99
Stacker 4.0 Upgrade #284991	49.99



Communications

Carbon Copy 2.5 #477723	139.99
Close Up 5.0 Host/Remote #218721	139.99
Eclipse Fax v/OCR #164224	39.99
Internet Kit/Win #336434	39.99
Procomm Plus 2.0 #487431	139.99
Smartcom for Windows #164832	49.99
Winfax Pro 4.0 #294492	77.99

Database

Access 2.0 #297941	329.99
Approach 3.0 #256494	99.99
uc Easy Accounting #264624	48.99
Dbase For Windows 5.0 #366115	359.99
My Advanced Mail List #251561	39.99
PowerMaker 3.0 #221951	189.99
PowerViewer 3.0 #221940	89.99



Business

mi Pro 3.01 #118642	299.99
Harley Givens Money Guide #292670	39.99
uc Easy Accounting #264624	99.99
Inside Daily Planner #225170	29.99
reach Power Translator #268944	109.99
ermon Power Translator #268822	109.99
IS Money 3.0 #281954	29.99
IS Word 6.0 #226251	299.99
IS Works 3.0 #238745	79.99
IVDB 4.0 #294141	59.99
eachtree Accounting #474775	119.99
ales & Marketing Success #143883	59.99

SmartSuite 3.0 #499832	499.99
Spanish Power Translator #268833	109.99
Success, Inc #143874	89.99
Windows On Wall St V 2.1 #263781	99.99

Graphics & Design

Aldus PageMaker 5.0 #548991	599.99
Astound #263883	128.99
Corel Draw 3 to 5 Upgrade CD #363555	319.99
Corel Draw 3 to 5 Upgrade 3.5 #363582	419.99
Corel Draw 4 to 5 Upgrade CD #363564	219.99
Corel Draw 4 to 5 Upgrade 3.5 #363591	259.99
Corel Draw 5 CD #363522	519.99
Corel Draw 5 3.5 #363544	599.99
Floorplan Plus #138152	34.99
Morph 1.5 #274054	69.99
MS Publisher 2.0 #153121	99.99
Windows Draw #135954	59.99

Education

Bodyworks/Win #266884	44.99
Kid CAD #331803	29.99
MathBlaster: Search for Spot #241553	35.99
Spanish Assistant #223840	59.99

Entertainment

Best of Entertainment Pack #313565	19.99
Bicycle Budget Solitaire #283231	12.99
Microsoft Windows Arcade #159442	27.99

Utilities

CD Essentials/Win #293630	29.99
Clickbooks 1.1 #314613	51.99

Corel SESI 2 #259592	97.99
Dashboard 2.0 #166652	49.99
Direct Access 1.0/Win #272112	71.99
Disney Screen Saver #206714	29.99
Icon Hoar-it Too #284902	19.99
MacDisk 1.0 Win/DOS #267273	54.99
MS Win/Wrkgps 3.11 Add On #238763	49.99
Norton Antivirus 3.0 #24501	99.99
Norton Desktop 3.0 #232373	129.99
Print Cache 3.1/Win #163913	49.99
Screen Dreams Golf Digest #281442	21.99
Stacker 4.0 Win/DOS #285004	93.99
Star Trek:Screen Saver #162745	29.99
Uninstaller 2.0 #251743	49.99
Viruscom For Windows 1.5 #283854	89.99
Windowmagic 3.0 #294334	41.99
Ultimate Utilities Suite #223180	94.99
XTree 2.0 #207742	69.99



Ordering is fast and easy!

Order 24 hours a day, 7 days a week.

CompUSA is always ready to take your order... and get it to you as quickly and conveniently as possible.

Call for a free catalog.

To place an order or for a free catalog listing over 5000 computer products call 1-800-COMP USA.

Standard Delivery.

For a minimal fee, we'll ship your order anywhere in the world within 5 to 7 working days.**

Next-day Delivery.

We'll be happy to ship your order for delivery by the following day (except Sundays). Additional delivery charges apply.

Fax orders welcome!

You can fax your order anytime! Fax 1-800-FAX-2212.

International Orders: 1-214-888-5770

International Fax: 1-214-888-5760

Government Sales: 1-800-862-3088



COMP USA DIRECT

1-800-COMP USA

2 6 6 7 8 7 2

SOFTWARE PRODUCT OF THE YEAR

CorelDRAW 4 Wins Prestigious International Award

- CHIP Magazine, Germany, March, 1994



COREL DRAW! 4

The Best in Graphics

...and more!

CorelDRAW 4 has been honored with an unprecedented award by becoming the first **graphics** software package ever to win Germany's CHIP award — *best overall software package of all categories*. The winner of over 150 awards, CorelDRAW 4 is recognized internationally for its overall excellence and unsurpassed power! CorelDRAW 4 has all the power and modules of CorelDRAW 3 and so much more! It's the ideal desktop publishing tool. CorelDRAW 4 includes advanced word processing features, multi-page layouts, OCR, animation capabilities, and dozens of new artistic and special effects; with **more** fonts, **more** clipart images and symbols, **more** graphics capabilities and **more** business applications.

Includes:

- ILLUSTRATION
- PHOTO-EDITING
- ANIMATION
- CHARTING
- PRESENTATIONS

and more!

- VISUAL FILE MANAGEMENT
- ADVANCED DIRECT SCANNING
- POWERFUL OCR
- SINGLE-STEP FORMS TRACING
- FLEXIBLE MULTI-PAGE LAYOUTS
- EXPANDED DTP FEATURES
- THOUSANDS OF FRACTAL TEXTURES
- DAZZLING SPECIAL EFFECTS
- CONVENIENT SPREADSHEET
- 100s OF ANIMATIONS AND PROPS
- COMPLETE COLOR SEPARATIONS

♦ **over 18,000 Clipart Images & Symbols**

♦ **over 750 Fonts**

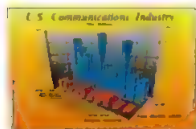


INCLUDES 2 VALUE-PACKED CDs

—featuring a complete CD version of CorelDRAW 4, plus libraries of clipart images and symbols, fonts, animation and sound, and a Video for Windows enhanced QuickTour.



Get Animated with CorelDRAW!



Versatile Charting and Convenient Spreadsheet



Create Dazzling Illustrations



COREL DRAW! 3

The Best In Graphics

Award-winning CorelDRAW 3 is celebrated worldwide for its ease of use, incredible value and outstanding features. CorelDRAW 3 has precision type control, amazing special effects, and powerful illustration tools which make it the perfect entry-level graphics package.

♦ **over 14,000 Clipart Images & Symbols**

♦ **over 250 Fonts**

\$379.89

DR3 Disk version

\$128.33

DR3 Disk version

\$339.

DR4 CD version

\$95.40

DR3 CD version



**COMPUTER DISCOUNT
WAREHOUSE™**
1-800-279-4CDW

COREL®
1-613-728-3733 ext.20

CIRCLE 011 ON READER SERVICE CARD

FACT FILE

TrueCAD for Windows, Version 2.10c

List price: \$295 **Requires:** 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later **In short:** TrueCAD for Windows combines a clean and efficient Windows interface that includes drop-down menus, a toolbar, and floating toolboxes with a well-designed core graphics system that provides average speed. While the program's mechanical and architectural drawing abilities are limited in some areas, such as its inability to attach textual attributes to symbols, TrueCAD for Windows fits the bill as an easy-to-use, versatile, and low-cost 2-D CAD package

Choice Computing, 1287 E. Honeymoon Bay Rd., Greenbank, WA 98253, 800-828-2770, 206-331-3767; fax, 206-331-2123

47% on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	EXCELLENT
Mechanical drawing	FAIR	EXCELLENT
Workgroup support	POOR	POOR
Data management	FAIR	POOR

to a selected line, automatically trimming geometry around the symbol, scaling x and y directions independently, rotating, and mirroring the symbol in x and y dimensions. As you select the options from the toolbar, the rubberbanding feature provides a preview of the result. Still, TrueCAD cannot attach textual attributes to the symbols to generate a bill of materials. The package produced middle-of-the-pack results on our performance tests.

Simple and efficient to use, yet powerful enough for most 2-D drafting tasks, TrueCAD breathes some fresh air into a crowded marketplace. Look for the next version, which is due out in early 1995, to address some of TrueCAD's limitations and to build upon its strengths as a powerful, low-cost CAD system.

IMSI

TurboCAD for Windows

BY JOEL N. ORR

TurboCAD for Windows, Version 2.01 (\$149.95), manages to offer the proper tools for a variety of professions, and it does so at an affordable price. And if you spring for the \$59.95 Special Options Package, which contains home-design li-

braries and a program that converts TurboCAD drawings into ten different graphics file formats, your dollars-per-feature rate will be even better.

This product makes a respectable showing in terms of capabilities. Small architectural, landscaping, metalworking, plumbing, HVAC (heating, ventilation, and air conditioning), and woodworking shops might find TurboCAD for Windows to be

sufficient for all their professional drafting needs. And .DXF import and export will allow such firms to exchange information with other professionals who use AutoCAD or other CAD packages.

TurboCAD has full floating-point coordinates, which give the package's drawings a very wide dynamic range. What that means is that you can zoom in on the smallest feature (a screw) on a very large

Finally, Accurate OCR.

Get Unbeatable Accuracy With WordScan™ Plus 3.0, The only OCR with Adaptive Recognition Technology.™

Welcome to the next level of OCR accuracy—WordScan Plus 3.0 for Windows.

It delivers unbeatable accuracy because it's the only software with Adaptive Recognition Technology—Calera's "neural net" engine that learns as it goes. This highly precise engine doesn't just read letters, it actually recognizes words in context. So you see spectacular results. No matter what you scan.

You also get Hewlett Packard's AccuPage™ 2.0 technology, OLE 2.0 support, and our Chameleon Tool Bar.™ Which means you get both accuracy and ease of use in one. No other OCR package even comes close.



But don't take our word for it. Try WordScan Plus 3.0 on our 30-day Free Trial Offer and judge for yourself. On every page of every document, you'll get the OCR accuracy you've always wanted. Finally.

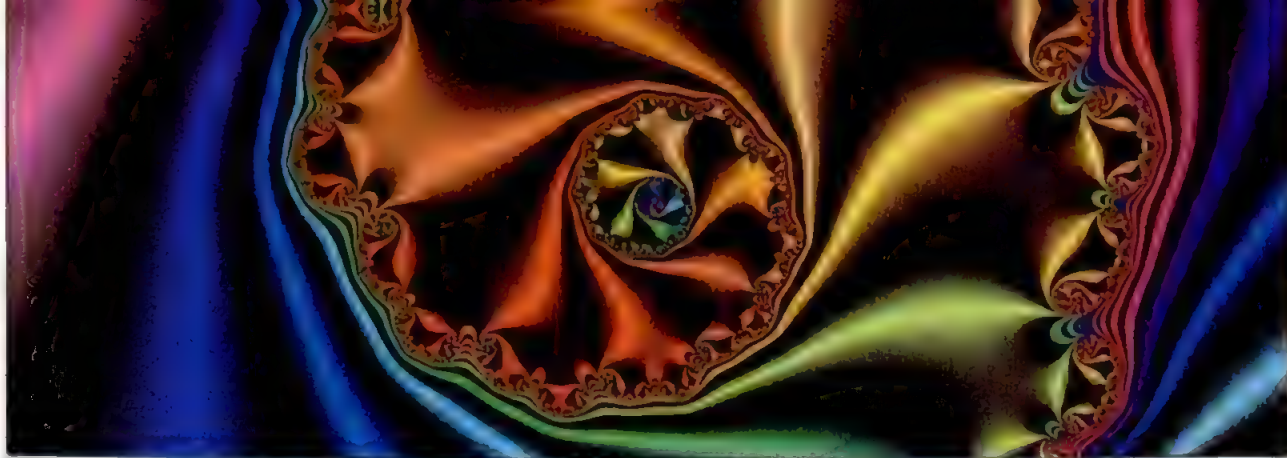
\$149 Competitive Upgrade*
1-800-422-5372 Ext.550

CALERA

UNBEATABLE OCR ACCURACY

*OMNIPAGE USERS: Upgrade to the breakthrough accuracy of WordScan Plus 3.0 for only \$149 with proof of ownership. Offer good in U.S. and Canada only. © 1994 Calera Recognition Systems, Sunnyvale, CA. 408-720-8300 FAX: 408-720-1330.

Try WordScan Plus 3.0
30-day Free Trial Offer



GoldStar

What's The Big Idea?

Whatever idea you have in mind, watch it come to life on one of the big color monitors from Goldstar. With flat square tubes and a sharp edge-to-edge display, they give you room to open your windows wide and power to handle the most demanding graphics applications.

If you're big on the environment, our monitors are MPR II and Energy Star compliant. And if you're big on Macs, we're also Macintosh compatible.

Backed by a 2 year parts and labor warranty, our monitors have a world-wide reputation for value and reliability. So if you've been thinking about expanding your horizons, take a look at the monitors from Goldstar. The idea is catching on.

	Dot Pitch	Max. Resolution	Max. Ergonomic Resolution	Horizontal Scan	Dynamic Focus	Digital Controls	DPMS	100-260 VAC
Model 1520 15" FST w/ Inver mask	.28mm	1280 x 1024	1024 x 768 (76Hz)	30-65KHz		Yes	Yes	Yes
Model 1725 17" FST w/ Inver mask	.28mm	1280 x 1024	1024 x 768 (76Hz)	30-65KHz	Yes	Yes	Yes	Yes

GoldStar
MONITORS

All The Qualities You're Looking For

Goldstar U.S.A., Inc. 1000 Sylvan Avenue, Englewood Cliffs, NJ 07632

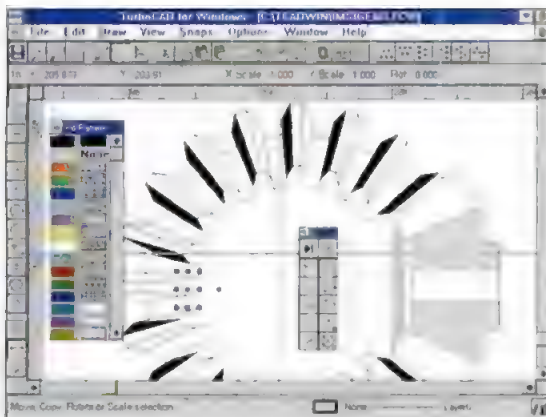
All brand names or trademarks are property of their respective owners. The Energy Star emblem does not represent EPA endorsement of any product or service.



CIRCLE 371 ON READER SERVICE CARD

GRAPHICS

2-D CAD Software



All the drawing tools and snaps are right at hand in TurboCAD. A label on the cursor changes as you move it over icons to indicate the name of each, while a fuller explanation appears in a box at the bottom of the screen.

and detailed drawing (an aircraft carrier, for instance).

TURBO TOUCHES

In TurboCAD, sensibly crafted icons in a reasonably flat hierarchy make it possible to avoid the pull-down menus almost entirely. A label on the cursor changes as it moves over the different icons to indicate the name of each, while a fuller explanation appears in a box at the bottom of the screen. The same box guides you through multistep commands, such as fillets or radial copies.

All of these amenities stay nicely on the edges, so that even on a small screen you can use most of the real estate for drawing. The Local Toolbar is a useful adjunct: Right-click and it pops up at the cursor location as a floating palette of snaps and other tools appropriate to the task. As soon as you click on one of the tools, the toolbar disappears. Also, the package's Undo function is unlimited, although there is no Redo function.

The TurboCAD manual contains tutorials that work in concert with preinstalled tutorial files. The reference manual has appropriate illustrations and an easy-to-read layout, as well as a good index. Also, the on-line help files are clearly written.

Both the functionality and the available symbol libraries reflect a bias toward architectural and schematic applications. (The company, though, is planning to release add-on libraries with 6,000 mechanical symbols included.) There are sufficient mechanical drafting capabilities but no di-

mension tolerances. You can, of course, position blocks of text for tolerances; but this is a workaround, not a solution.

BRAKING

TurboCAD is not without flaws. When we tried to create an arc-to-arc fillet, the wrong sections of the arcs were truncated. It turns out the function does work—as long as the arcs are nonintersecting. One workaround is to use the very convenient arc-breaking function to cut up the arcs at their points of intersection. Another is to draw lines tangent to the arcs, filleting them, and then group the fillets with the arcs.

But this approach is a nuisance. The company says this problem is being addressed.

Also, mirroring is not a straightforward function. It's implemented as part of the Linear Copy command, which makes a specified number of copies in a line. You specify the distance between them—and you can also scale in *x* or *y* and rotate in the same operation—but the scaling is not at all intuitive. The manual says to mirror by simply specifying -1 in the *x* or *y* boxes; what it doesn't tell you is that everything

depends on the location of the reference and rotation handles. TurboCAD needs a simple "mirror" tool.

Possibly the greatest limitation of the program is that no more than 16,384 entities can exist in a file. Our Radial Copy and Rotate test could not run to completion because of this limit. TurboCAD did okay on our plotting test, but it turned out that its .DXF importer gave us two copies of everything (we used a standard .DXF file for all our tests, to make the results comparable in some sense). The .DXF problem affected the Plot to File test results. Company representatives say that this difficulty with .DXF importing occurs only when there is a translation problem. IMSI is aware of the problem, and promises an improvement in the near future.

TurboCAD for Windows is a full-featured CAD program with only minor flaws that is inexpensive, a good Windows citizen, and easy to learn and use. For the builder, plumber, craftsperson, or CAD beginner, choosing this package is a no-brainer: Get it.

Automated Methods Inc.

● Ultimate CAD for Windows Base

BY ALAN D. SMITH

As a general-purpose CAD product, Automated Methods' \$995 Ultimate CAD for Windows Base, Version 2.1, performs satisfactorily, but its lack of double-line wall creation and database functions caused it to fare poorly on our architectural drawing and database tests.

The product seems to make everything easy to perform and customize. When the Ultimate CAD group is opened, the user is provided with icons for customizing menus, editing shape files, making custom linestyles, customizing arrows, setting background colors, editing icons, and accessing the internal programming language, SEGAL.

Once the application is launched, the operator is greeted with the typical Microsoft Windows-style interface. Along with pull-down menus and tool palettes, Ultimate CAD has its own status and controls section called the Workspace Header. Displayed in this header are prompts for system interaction and relevant menu buttons that change with the current activated

▶ FACT FILE

TurboCAD for Windows, Version 2.01

List price: \$149.95 **Requires:** 386-based PC or better, 2MB RAM (4MB recommended), 5MB hard disk space, Microsoft Windows 3.1 or later **In short:** The astonishingly low price of this product belies its extensive capabilities and well-designed Windows interface. TurboCAD for Windows is easy to learn and use, highly customizable, and downright powerful. The product also has its fair share of flaws, including difficulties with arc-to-arc fillet, a poor scaling function, a rather unintuitive .DXF import function, and an entity limit that may frustrate some power CAD users.

IMSI, 1938 Fourth St., San Rafael, CA 94901, 800 833-4674, 415-454-7101, fax, 415-454-8901

477 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	GOOD
Mechanical drawing	GOOD	FAIR
Workgroup support	N/A	N/A
Data management	FAIR	FAIR

command. For example, when you're creating geometrical figures, one of the displayed buttons lets you set the cursor snap method.

Further ease of use comes in the form of icons, which are larger and more readable than those in most products. Unfortunately, these large icons and the Workspace Header do take away from the available drawing area, which is already smaller than

the drawing area in most products.

Ultimate CAD nests each command below the previous command in a menu queue. You press Esc or the right mouse button to back up to the last menu item, thereby repeating operations without having to reselect menus or icons. This works well in theory, but there is a problem: Often, when we attempted to exit or undo a command, the system responded with an

error message that stated that commands were nested too deep. It also said that Esc should be used to return to the command list to eliminate this nested menu situation. This was a cumbersome process, and the fact that there was only one level of Undo only complicated matters.

Like many of the other products we tested, Ultimate CAD features a flood option to perform quick hatching functions. But when performing a hatch in our test drawing, the software went into an automatic mode of calculating intersections and undershoots before we selected any objects. When it was finished, we selected the inside of the proper area. The entire process took far longer than was necessary.

DRAWING TOOLS

Ultimate CAD offers both hatching and filled patterns. There weren't many predefined hatching patterns for mechanical design other than angle, cross-hatch, and lined hatch with settings to determine the spacing between lines. The package's filled patterns include arrows, brick, circles, and several random line patterns. Other patterns must be created or imported by the user. Attribute editing does allow for changing the pattern or hatch settings either during the



Printer Port Connections Are The New Tools Of The Trade.



nce you discover just how easy it is to install a backpack CD-ROM drive to your computer, you'll never be inconvenienced by conventional installation methods again. Just plug backpack into your computer and you're ready to go. No interface cards, hardware conflicts or expansion slots required. Because of its unique printer port interface, backpack fits all IBM PC compatibles and portables regardless of CPU speed. In addition, a built-in audio circuit with both headphone and line output jacks allows for connection of sound cards or Hi-Fi. You can run thousands of your favorite multimedia programs and view Kodak™ Photo CDs too, with CD-ROM backpack. Compact and versatile, you can expect backpack to go wherever you go, bringing with you the wealth of information CD-ROM storage makes possible. Printer pass-through is included. Tape drive, hard drive and diskette backpack drives are also available. Call today for ordering information and a dealer nearest you.



MicroSolutions

132 W. Lincoln Hwy.
Dekalb, Illinois 60115
Telephone 815.756.3411 Fax 815.756.2928
Call Toll Free 800.293.1214

CIRCLE 855 ON READER SERVICE CARD



Photo CD symbol is a trademark used under license

► FACT FILE

Ultimate CAD for Windows Base, Version 2.1

List price: \$995 **Requires:** 386-based PC or better, 6MB RAM, 15MB hard disk space, math coprocessor, Microsoft Windows 3.x **In short:** Although Ultimate CAD for Windows combines a highly customizable easy-to-use interface with a wide array of architectural and mechanical drawing tools (not to mention a powerful programming language to build custom macros), the product stumbles when it comes to providing many of the core features CAD professionals need. Along with failing to support any attribute or database functions, Ultimate CAD for Windows provides somewhat unpredictable operation that can ultimately be a roadblock to productivity.

Automated Methods Inc., 43 Butterfield Circle, Suite C, El Paso, TX 79906, 915-774-0856, fax, 915-778-1988

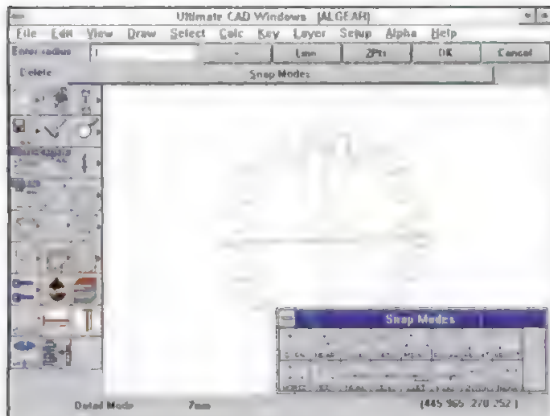
478 on reader service card

ADAPTABILITY TO TASK

	Power	Ease of Use
Architectural drawing	FAIR	GOOD
Mechanical drawing	FAIR	FAIR
Workgroup support	FAIR	FAIR
Data management	FAIR	FAIR

creation of the object or afterwards.

Modifying dimension-text location, text size, and arrow directions proved to be as awkward as hatching. To relocate the text of a dimension, we had to go through a complicated series of menus and dialog box queries. Down, Up, Right, and Left controls are visible in the Workspace Header and must be used for incremental movement of the text. In addition, the screen must be redrawn in order to remove the old text shadow and display only the text in its new location. This need for selecting these



Ultimate CAD's user interface has large, removable icons. A status and controls section, called the Workspace Header, prompts you for system interaction and relevant menu buttons that change with the current activated command.

direction buttons and redrawing the screen in order to shift text is another process that is unnecessarily involved.

There are other problems. For example, when we trimmed the arcs that made up the gear in our mechanical drawing test, it took many tries before we could fillet the left side of the gear properly. And although the cursor snap options were generally sufficient, multiple steps were required to find the center point of the arcs and circles.

Because the package does not include double-line wall generation in its pattern functions, we were not able to complete the architectural drafting portion of our testing satisfactorily. This feature, True-Type support, and node editing are expected in the next release, which should be available by the time you read this.

Although Automated Methods obviously put a lot of thought into Ultimate CAD's interface, the company dropped the ball when it came to streamlining some of the features that mechanical and architectural designers use most often.

Ashlar Inc.

● Vellum

BY BRYAN M. WINTER

Ashlar's mechanically inclined, \$2,495 Vellum, Version 2.12, delivers an intuitive, well-thought-out interface backed up by an engine that lacks some basic CAD features but provides such exotic features as parametric design and a geometric relationship checker. The latter, the patented Drafting Assistant, lets you brush over the

construction points of a drawing and have the program automatically lock onto the point you need. Other programs have similar snap locks, but Vellum goes one step further and includes a construction line to illustrate the relationship. The Drafting Assistant's constant motion is offset by the minimalist nature of the rest of the interface.

VELLUM FINISH

Vellum's interface is a direct translation from that of the original Macintosh version of the product, with a tool palette on the left side and a status line along the bottom. There is no

command line, but you can input most commands via key combination. The package always lets you know which functions you can use and provides pointers for guidance.

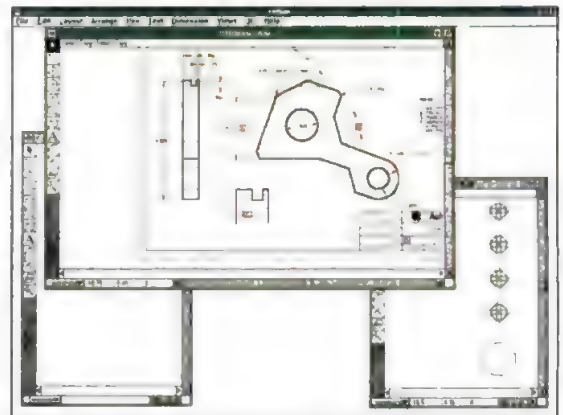
At first glance, the menu selections appear to have more in common with desktop publishing than with other CAD programs. Dialog boxes are everywhere, and the major construction commands are represented by icons. There are many commands that may seem unimportant to the general CAD audience but that are useful in a number of more mechanical applications. For instance, specifying an arc by its radial length may not seem too important to a facilities manager, but it is critical to a designer who has to calculate the motion of a gear. To wit, the mechanical gear drafting portion of our test went rather smoothly.

PARAMETRIC DESIGN

Vellum offers a page-setup system, called Sheet Into View (similar to AutoCAD's Paper Space), that allows for several views or multiple scales on one page. The system treats an entire project as a drawing that can be paged out onto sheets. This linking function ties in nicely with Vellum's cutting-edge parametric design feature, which allows for angles or distances to be set and changed (the resulting change is applied automatically to all related parts). Vellum's parametric design feature cannot handle certain complex part designs, but it is useful. Also, you can display and edit more than one drawing file at a time.

Vellum's main focus is mechanical engineering. It follows the American National Standards Institute (ANSI) specs for its drafting tools. The hatch library and dimension settings are set up for drafting, and the manual gives help on conforming to ANSI text and sheet-size specs.

Milling notation for machine parts is one of Vellum's many useful features. This notation is a set of symbols used to describe machining functions for either a tool operator or a computer-aided manufacturing (CAM) platform. The ability to move an idea into this type of rapid prototyping machine can be indispensable for mechanical designers. The package also comes with a selection of predrawn mechanical, plumbing, and electrical symbols. Unfortunately, third-party support is limited to what Ashlar ships with the product. In a few months, some third-



Vellum lets you edit several drawings at a time. There is no command line, but you can input most commands via key-stroke combinations. Also, the package always lets you know what functions you can use.

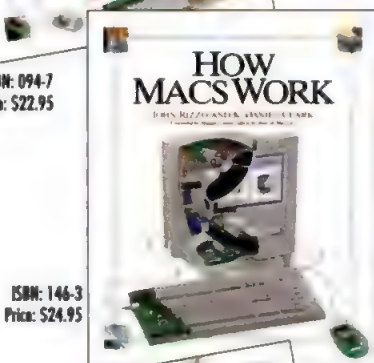
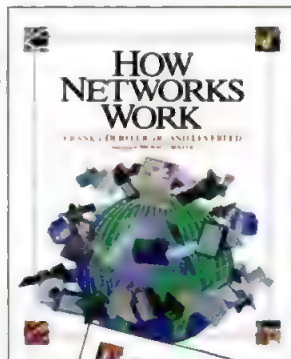
Imagination. Innovation. Insight.

No other books bring computer technology to life like the *How It Works* series from Ziff-Davis Press. Lavish, full-color illustrations and lucid text from some of the world's top computer commentators make *How It Works* books an exciting way to explore the inner workings of PC technology.



ISBN: 094-7
Price: \$22.95

ISBN: 129-3
Price: \$24.95

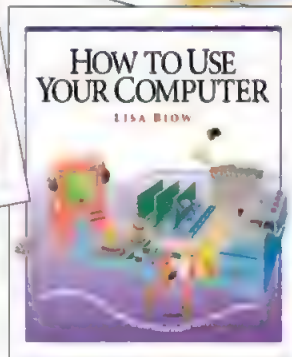


ISBN: 146-3
Price: \$24.95



ISBN: 146-8
Price: \$15.95

ISBN: 133-1
Price: \$24.95



ISBN: 155-2
Price: \$22.95

**AVAILABLE
AT ALL FINE
BOOKSTORES OR
CALL 1-800-688-0448, EXT. 8367**



► FACT FILE

Vellum, Version 2.12

List price: \$2,495 **Requires:** 386-based PC or better, 8MB RAM, 5MB hard disk space, math coprocessor, Microsoft Windows 3.1 or later **In short:** Vellum is a highly touted but narrowly focused CAD product that shines primarily in mechanical design. It has a simple but powerful interface based around Drafting Assistant—a patented construction tool that has been copied by other packages. Vellum provides a few exotic tools, such as parametric design and a geometric relationship checker, that you won't find in other products. Still, the program is not suitable for complex architectural drawings but has a good feel for informal design work.

Ashlar Inc., 1290 Oakmead Pkwy., Sunnyvale, CA 94086
800-966-2348, 408-746-1800, fax, 408-746-0749

479 on reader service card

SUITABILITY TO TASK

	Power	Ease of Use
Architectural drawing	GOOD	FAIR
Mechanical drawing	GOOD	GOOD
Workgroup support	FAIR	FAIR
Data management	N/A	N/A

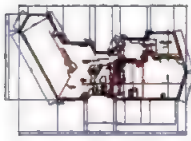
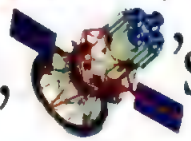
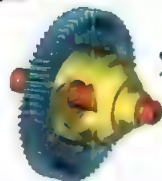
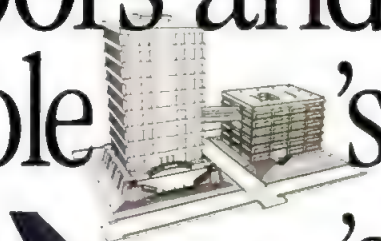
party symbol libraries should be available to users.

A BIT SHALLOW

Vellum can handle a variety of drafting tasks, but the package lacks many of the necessary symbol libraries and utilities that focus on construction. Several important items were unavailable for our architectural drafting tests: There was no architectural font, solid-wall fills were unavailable (they are taboo in engineering drafting), and the only other way to fill walls in 2-D was to use line widths that were again defined by actual size as opposed to scaled size.

Thanks to Vellum's intelligent interface, you'll spend more time drawing than figuring out the menu hierarchy. Still, the interface is almost too elegant: It buries several discrete but related commands into a single command or scatters related command variables throughout the menus. Moreover, the program's lack of data management seems antithetical to the needs of a CAM system. Ashlar's Vellum is better suited for mechanical engineering and drafting than for architectural work, but unless you need its special features, it is an expensive solution. □

Yes,
 you can do Windows™
 and walls and doors and
 floors, ceilings, whole 's,
 's, trains, boats, 's,
 chains, 's, diamond rings, 's
 and things, 's, power plants, topo maps,
 's, helicopters, roads
 and bridges, circuit boards, 's
 power lines, 's, airports, furniture,
 digital terrain models, 's, skateboards, the
 's, chemical plants, 's, golf courses,
 anything you can think of ... even the kitchen



MicroStation. CAD software for Windows and Windows NT

Open yourself to a world of design possibilities with MicroStation CAD software. From 2D drafting to advanced 3D surface modeling, MicroStation Version 5 is the ultimate design tool for the Windows environment. And the most complete, with photorealistic rendering and animation. All in one package!

Join the many designers who have made the move to the CAD tool for the '90s.

Call 800-345-4856 for a free demo disk and brochure on MicroStation.

 **MicroStation**
 CAD for the '90s

INTERGRAPH

MicroStation models courtesy of Viewpoint Animation Engineering. Intergraph and the Intergraph logo are registered trademarks of Intergraph Corporation. MicroStation is a registered trademark of Bentley Systems Inc., an Intergraph affiliate. Other brands and product names are trademarks of their respective owners. © 1993 Intergraph Corporation, Huntsville, AL 35894-0001. LEAD-14940

CIRCLE 358 ON READER SERVICE CARD

See Us
at Comdex Fall
Booth S 2524

CTX Introduces the Better-Than-Perfect Notebook.



Once again, CTX brings you more for less.

Introducing EzBook™, a powerful 486 notebook computer with all the great features PC Magazine calls for in its ideal, *hypothetical* notebook PC. And more.

More 486 DX4 power (100MHz) and 60 percent more disk capacity (520MB).

What's more, this better-than-perfect notebook is real and available now. And you can get one with its optional docking station complete with CD-ROM drive already built in for about the same low street price of \$4500.

But if you're willing to settle for just a "perfect" EzBook notebook (PC Magazine's configuration), we can save you somewhere around \$1000.

Or, if you want to save even more and be just slightly imperfect, get our economy EzBook with a monochrome or dual-scan screen, 4MB of RAM, a 260 MB disk, and no docking station for as low as \$1549. You save nearly \$3000.

More for less. That's just what we've been offering in color monitors for years. And now we out-sell all the names you know best — like Sony, NEC, Mitsubishi, Samsung, and IBM.*

Who knows how successful CTX notebooks will be? But better-than-perfect isn't a bad place to start. Call 1-800-888-9052 ext. 101 for more information on where you can get the real, ideal notebook.



© 1994 CTX International. *Official 1993 Monitorak statistics.

Betting on the Dream

ISDN is slowly becoming a reality, but it's still not widely available. There are a number of products that connect your LAN with your remote sites, but they're far from mature.

No other technology can make you so happy or frustrate you so badly as ISDN (Integrated Services Digital Network). As we tested ISDN products designed to extend a LAN's reach, we came to love the power of ISDN—but we also sighed deeply over the faults of both the implementation of the technology and the products.

Basically, ISDN is a digital version of switched-circuit analog telephone lines. You even contract for the service through your local phone company. The data transmitted over ISDN lines is digital and is much faster than analog modem transmission. Thus, things like live videoconferencing and remote LAN connections become more palatable. ISDN runs at 64 Kbps over one channel and 128 Kbps over two.

ISDN products can work for you today and provide fast, economical LAN access—at least four times faster than the highest-speed modems. But the system as a whole is a long way from being as usable or as interoperable as those modems.

Using a remote ISDN LAN connection is like being there. If you drag a very large file to or from the server, you can sense some delay; still, the 128-



► IN THIS REVIEW

Ascend Pipeline 50	274
Combinet Everware 160 and 400.....	274
DigiBoard PC IMAC and PC IMAC/4.....	275
Extension Long Distance LAN Adapter E-101 and E-201	282
Gandalf LANLine 5240i.....	287
Intel RemoteExpress ISDN Bridge Pack and LAN Adapter.....	288
Editors' Choice	269
ISDN Nuts and Bolts	270
Benchmark Tests.....	272
A Glossary of Terms for ISDN	277
One Man's ISDN Travails.....	279
IBM's Analog/Digital Twist.....	282
Summary of Features.....	286

By Frank J. Derfler, Jr.

Kbps or better throughput served up by these products seems like a local LAN connection to most people most of the time.

We didn't even find it necessary to bring NetWare LOGIN, MAP, and other utility programs onto the remote PC's hard drive, which you must do when you use remote-access products connected over a modem. (For more information on remote access, see "Extend Your Reach," August 1994.)

We examined six ISDN packages: Ascend Communications Inc.'s Pipeline 50, Cominet's Everywhere 160 and 400, DigiBoard's PC IMAC and PC IMAC/4, Extension Technology Corp.'s Long Distance LAN Adapter E-101 and E-201 (LD-LAN), Gandalf Technologies' LANLine 5240i, and Intel Corp.'s RemoteExpress ISDN LAN Adapter and Bridge Pack.

We gathered products that provide transparent, on-demand ISDN remote-node connections between a local network and a distant LAN or PC. They present an NDIS (Network Driver Interface Specification) or ODI (Open Data-Link Interface) interface to the networking software, either directly or through a LAN adapter. We also have a short piece on IBM's WaveRunner, which is a dial-up ISDN adapter that does not provide on-demand service but integrates with IBM's LAN Distance communications server software. (See "IBM's Analog/Digital Twist.")

In our testing, we found that performance was pretty flat with noncompressible files but varied greatly for highly compressible files. Overall, the products from Cominet and Gandalf consistently produced the best throughput. But these products use awkward configuration systems that require separate serial port connections and terminal emulation. Products from DigiBoard and Intel don't have the speed, but they are easy to manage and will probably lead in the development of cross-vendor compatibility.

Developing a direct comparison of installation costs is tricky because some of

these products need extra components to make a complete system. But it's evident that DigiBoard has established the most aggressive pricing—particularly considering you can inexpensively expand its PC IMAC/4 to provide more lines to the

server. The hardware for two ends of a DigiBoard system (plus two NT1s) will retail for about \$2,190. That's less than half of what a similar Gandalf system costs and well under all other competitors, which hover around the \$2,700 to \$3,000 mark.

DREAM CONNECTIONS

We were surprised by how easy it was to interface with the telephone central office. Each product worked well and required no custom configuration of the telephone company's equipment. Work done by groups as diverse as Intel, the National ISDN User's Forum, and the Cor-

poration for Open Systems has made it possible to order a service code-named "Intel Blue" or "Generic 2" and to have a good probability of success.

Perhaps the only surprise you might have during installation is that most products (except the Cominet Everywhere 160 and some versions of the Ascend and Gandalf products) do not provide their own termination to the ISDN lines. An additional termination unit, made by companies like AT&T and Northern Telecom and generically known as an NT1, adds at least \$200 to each end of the link.

NOT A NIGHTMARE, BUT...

Despite how well these products work, they are only on the brink of being ready for prime time. For one thing, many people still have significant problems getting ISDN service. As our sidebar "ISDN Nuts and Bolts" shows, service is on the rise—but it can still be spotty. There are many large areas where service is hard to get, typically because of local tariff and rate issues. (Our John Dvorak took time to relay his own struggles in "One Man's ISDN Travails.")

It costs a telephone company \$100,000

HIGHLIGHTS

ISDN Products

A VERY POPULAR IDEA FOR ITS

digital transmission, potential data-transfer rates of 128 Kbps or better, and reputed accessibility, ISDN still is not a realized technology. When it is made practical and effective, ISDN will quickly replace analog transmission through modems for countless remote users and businesses wanting to connect sites.

THE POOR AVAILABILITY

of individual connections to ISDN lines remains one of the stumbling blocks to widespread use. More and more, though, the Regional Bell Operating Companies (RBOCs) and local exchange companies (LECs) are increasing service areas. But it still doesn't make sense that an area such as Manhattan is without ISDN service. Some RBOCs are more progressive than others in getting customers connected.

THIS SET OF ISDN CONNECTIVITY

products is reasonably well executed but very far from mature. You need to make trade-offs: speed instead of ease of installation or easy management versus lower price. DigiBoard has taken the most aggressive pricing route with the PC IMAC and PC IMAC/4, but most of the products here offer relatively similar functionality and ease of use. We saw the most pronounced performance differences between ISDN packages in the handling of highly compressible files.

INTEROPERABILITY

is nonexistent right now among these solutions. This is an unfortunate throwback to the early development of analog modems that must be implemented rapidly if ISDN is to find widespread acceptance.

*We were surprised by
how easy it was to inter-
face with the telephone
central office. Products
worked well without
custom configuration.*



• DigiBoard PC IMAC and PC IMAC/4

ISDN connectivity products for the PC have a ways to go before they are as usable and interoperable as, say, high-speed analog modems. Still, they have come down in price considerably and are more approachable than ever. Each of these solu-

tions is a reasonable choice, but each carries decided trade-offs. The packages displayed a relatively level playing field of features and performance, so we focused on ease of use, cost, and management.

We awarded our Editors' Choice to DigiBoard's PC IMAC and PC IMAC/4 internal ISDN solution, principally for its ease of use, good Microsoft Windows-based LAN-side interface, and

great pricing. Despite its slower performance, it is far and away the best buy in this roundup. It is also the most expandable solution here, and it integrates well into your NetWare environment.

DigiBoard's solution can be made transparent on the remote end, and the internal board gives the network manager good control over the connection. If the external bridges in this review had

or more to prepare one local switching office for ISDN, so if state or local regulators don't allow a reasonable return on the investment, the service doesn't appear. Even if you can get the service from your local telephone company, our experience shows that you can still have problems dialing across the country (see "Tales from ISDN Pioneers").

But the biggest drawback to the commercial success of these ISDN bridge products is simply that they don't work together. The ISDN bridge from Vendor A can't talk to the bridges from Vendors B through F. You must have devices from the same vendor in order to form a link. This lack of interoperability, which seems like a throwback to the bad old modem days of the 1970s, is clearly unacceptable for products aimed at widespread commercial service.

The standards that will bring interoperability are almost in place. The Internet Engineering Task Force has extended the Point-to-Point Protocol (PPP) to include a method of combining (or "bonding") ISDN's two 64-Kbps B channels into one 128-Kbps pipe.

SIX DREAM MAKERS

The products we reviewed are classed as ISDN bridges. They sit on your LAN and transfer practically all the data they receive. But these are *smart* bridges, which makes everything more complex.

The smart software in the bridge helps

you to select specific categories of messages that will not go over the ISDN wire. The software can also do special tricks like compressing the repetitive header information in certain NetWare packets and using other compression techniques to improve throughput. Filtering and compression control the usage-sensitive costs of ISDN lines, but even small differences in these techniques create incompatibilities.

Two router tricks also used by these devices, spoofing and time-out, are worth further explanation. Many network servers, particularly NetWare file servers, frequently exchange status messages. Because the ISDN bridges work on an on-demand basis, they normally initiate a connection to pass a packet and then immediately drop it when the job is done. This means a new call every minute or so. With spoofing, the bridges assure the NetWare server that all is well without initiating a link to really check. This is usually okay, since the servers get an update when they do make a connection.

The time-out variable controls how

in-band management over IPX, they would be stronger contenders.

One of the few drawbacks to the PC IMAC solution is its lack of a better data-compression capability, which hurts performance. And it is an internal solution, so users with notebooks on the remote end will need to look elsewhere. Even taking these into account, the PC IMAC package is a solid ISDN solution from a company committed to making products that are both practical and interoperable.

We give an honorable mention to Extension Technology's Long Distance ISDN Bridge Pack and LAN Adapter package. The LD-LAN (also an internal solution) is priced higher than DigiBoard's PC IMAC package, but it offers good compression capabilities and strong performance.

long a link is kept up once it is established. This feature is particularly important if you pay by the minute. A time-out will save you money when you aren't using the service.

STANDALONE OR BUS?

These products split out along two different approaches. Three of the six—those from DigiBoard, Extension Technology, and Intel—come as expansion cards that sit in a PC. The other three take the form of a network-connected box that looks like a standard modem.

The external devices require a LAN adapter in the PC, something you might or might not already have. The internal cards do the job without a LAN adapter. Don't assume that the network-attached products require a full network installation: The network connection can be just a short length of thin Ethernet coaxial cable or a 10BaseT jumper cable. Through this kind of mini-LAN, the network-connected ISDN devices can service a calling laptop equipped with a

Our Contributors: FRANK J. DERFLER, JR., is senior networking editor of *PC Magazine*. ANATOLIY NOSOVITSKIY is a technical specialist and CHUL SUNG KIM is a technical specialist at ZD Labs. STEVE BAUM is a network consultant for GTE in California. JOHN C. DVORAK is a contributing editor, STEVE BUEHLER is testing coordinator, TIM M. CRAWFORD is a technical analyst, LESLIE WYGANT is a staff editor, and BRENDON M. MACARAEG is an editorial researcher for *PC Magazine*. GAIL SHAFFER was the associate editor in charge of this story, and ROBERT P. LIPSCHUTZ was the project leader.

• ISDN Nuts and Bolts

By Frank J. Derfler, Jr., and Steve Baum
For nearly 100 years, we've been served by a telephone system that uses analog voice circuits between the telephone company's central office (CO) and our premises. Despite dozens of new tele-

ment have decreased by better than 50 percent over the past 5 years.

WITH THE WORKS

When you begin to think about ordering ISDN, the first thing you should consider is whether all your calls will all be outside of your local phone company's service area. If all the calls will cross service areas, you should consider arranging for an ISDN direct-access line from a long-distance carrier.

Bypassing the local carrier will probably save you trouble up front and money every month. You should understand, however, that long-distance ISDN calls typically carry data at 56 Kbps in each B channel, because that is the standard rate of interexchange backbone service.

If any of your ISDN calls will be within the local service area, then you must use lines from the local exchange carrier (LEC). Our graphic here shows the

carriers and equipment involved in using local ISDN service.

ISDN is a usage-sensitive service; the more minutes you use and the farther you call, the more you pay. There are installation and monthly fees, but the biggest costs come from the per-minute charges. Large organizations can get flat-rate service under special contracts, but such service isn't typically part of standard tariffs.

DOLLARS AND SENSE

LEC pricing developed for telephone network access is determined through the application of complex cost allocations and recovery rules that are established by both federal and state regulators. Thus, ISDN pricing can vary by LEC and location.

A few carriers have tariffs for "non-business" ISDN service. Although that might seem to be an unlikely combination, it is actually a prelude to the coming connectivity to on-demand information and video services for residences.

The monthly service charges generally range from \$20 to \$60, plus local and state taxes and surcharges. On top of the monthly service charge, you'll pay about twice as much per minute for a business ISDN call as you do for a

Projected Percentage of Telephone Lines with Access To ISDN by 1995



Source: Bellcore, Information Gatekeepers Inc.

These projected percentages come from Bellcore's ISDN Deployment Data study for November 1993. (Bellcore was in the process of preparing a new issue of the report as we went to press; the percentages are updated regularly.) These are only projected percentages for the number of lines that will be able to carry ISDN. For an actual connection to your home or business, you will need to contact your local carrier and look into buying ISDN-ready equipment, such as the products reviewed in our main roundup.

phone innovations, the underlying service from the CO has stayed the same.

ISDN, the Integrated Services Digital Network, provides a digital link between the service point and the CO. Inside the CO, a computerized switch accepts dialing instructions and interconnects local and long-distance circuits on demand—hence the term *switched digital service*.

Availability of service has been the biggest stumbling block for ISDN's wider acceptance. The map here shows the probable percentage of lines that will have access to ISDN across the United States in 1995 (by region). Actually getting hooked up to the service remains an individual task. On the brighter side, prices on end user equip-

Dialing for ISDN

To find out about ISDN availability in your area, contact your local exchange provider and request pricing for basic rate services. If the service representative cannot help you, ask for the new products support group. You can obtain local information on availability and pricing through a number of sources, including regional and local providers and other industry and user groups.

Ameritech Menu-driven, 24-hour voice/fax-back, availability, pricing, 800-832-6328.

Bell Atlantic Product information, 800-570-4736.

Bellcore National ISDN information clearinghouse hotline, 800-992-4736.

BellSouth ISDN product information, 800-858-9413.

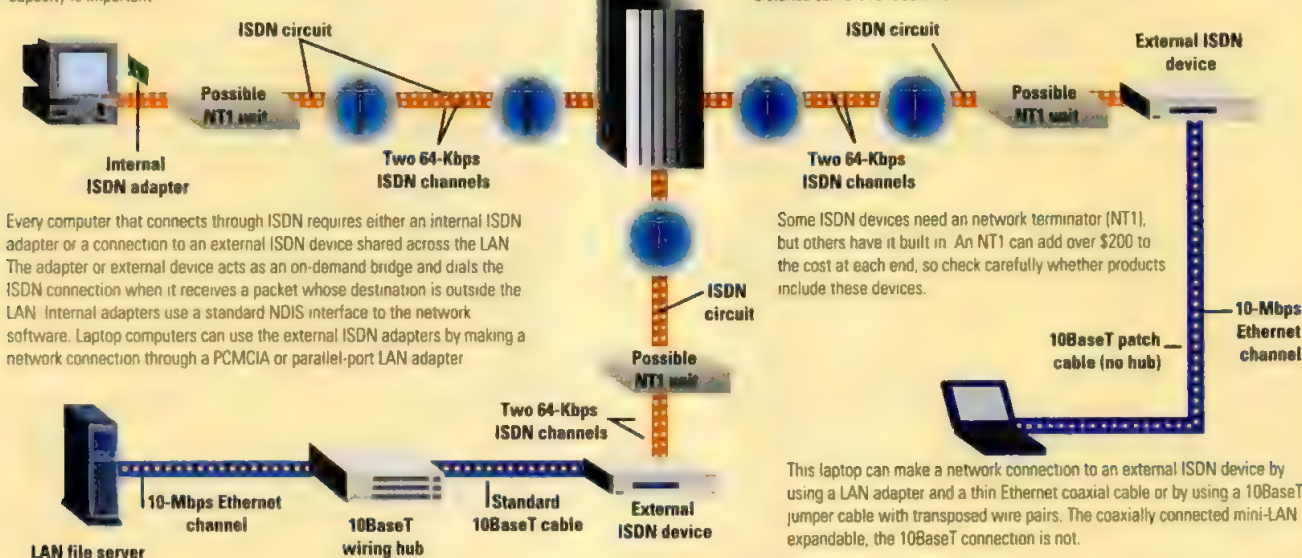
Cincinnati Bell Data product infor-

mation, 513-566-3232.

GTE Nationwide availability/pricing, 24-hour menu-driven voice response/fax, 800-888-8799; Nationwide Availability BBS via the Internet: telnet to "gteens.com". Log-on is "guest", password is "guest". Also, availability/service/ordering per GTE service area: California, 800-483-5000; Florida, 800-483-5200; Oregon and Washington, 800-483-

How to Make the ISDN Connection

An ISDN link is a digital connection to the local telephone central office with two 64-Kbps channels for data. The ISDN device can typically pump LAN traffic over one channel, perhaps using the other for voice, or aggregate both channels through bonding. With ISDN, you pay for what you use—so careful management of the capacity is important.



business voice call of equal length.

If you are on-line for more than 2 to 3 hours a day to the same location, you should consider using dedicated leased lines. As a rule of thumb, 2 to 3 hours is considered the average break-even point between dial-up and dedicated service; this will naturally vary according to local tariffs.

In addition, local carriers often give significant price breaks to their Digital Centrex customers. Under the

Digital Centrex arrangement, the telephone company uses the CO to provide the desktop telephone services that you might otherwise get from a private branch exchange (PBX) system. If you want local ISDN services, it's worth looking into Digital Centrex.

GETTING EQUIPPED

The telephone companies can supply you with ISDN equipment as well as service, but products like those reviewed here have enough in common with familiar devices like LAN adapters and modems that we think *PC Magazine* readers can do it themselves. If you need to, you can lease network terminators (NT1s) from the telephone company.

Because ISDN is principally a software service installed in the CO, many configuration parameters can contribute to creating incompatibilities with your end user equipment (called customer premise equipment, or CPE, in phone-speak). The telephone companies and equipment companies are trying to get together to eliminate dif-

ferences and make ordering easier.

Intel in particular has worked with the carrier community, and putting the designation "Intel Blue" on an order will usually result in the right setup for ISDN data products. The data devices try to avoid incompatibility by using very few of the services from the ISDN program.

There are other types of switched digital services, such as Switched 56, that provide throughput similar to ISDN's two 64-Kbps data channels by combining two channels. ISDN provides more services than Switched 56, including incoming caller ID, call routing, and nearly instantaneous call setup using a separate 16-Kbps channel. But if you can't get ISDN, connecting with one or two Switched 56 circuits is a useful alternative.

We've also listed several contacts here for you to call for information on getting set up with ISDN. We've included RBOCs and some local carriers. ISDN is a good choice for many businesses and remote user situations. It's worth looking into and should be increasingly available in the future. □

5100; Texas, 800-483-5400.

Nevada Bell General product information, 702-688-7124.

NYNEX General ISDN referral number, 800-438-4736.

Pacific Bell Menu-driven, 24-hour voice response for availability, 800-995-0346. Product information, 800-472-4736.

Rochester Telephone General Information, 716-777-1234.

Southwestern Bell Availability/service/ordering per serving area in Texas: Austin, 800-792-4736; Dallas, 214-268-1403; Houston, 713-567-4300.

US West Availability and pricing for Denver, 800-246-5226.

The numbers tell the story of ISDN's appeal. Transmitting over ISDN lines was up to ten times faster than the fastest modem transmissions over analog lines. Among ISDN products, the differentiating performance factor was individual file-compression schemes.

What the Numbers Mean

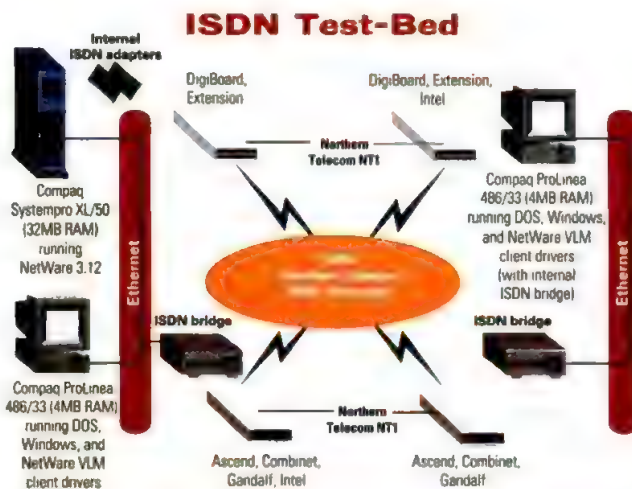
The ISDN products we tested were *fast*. How fast is 128 Kbps? Just compare these performance results to those in our roundup of remote-node servers ("Extend Your Reach," August 1994), all of which used 14.4-Kbps V.32bis modems.

In most cases, the ISDN products were ten times as fast as the remote-node products in completing identical file transfer tests. The worst performers in this mix still completed the tests in less than half the time of the best of the 14.4-Kbps modems. Not even the Microcom LANexpress remote server—with a 28.8-Kbps V.FC modem—could come close to these ISDN products. Remember, though, that even this fast wide area connection is slow compared

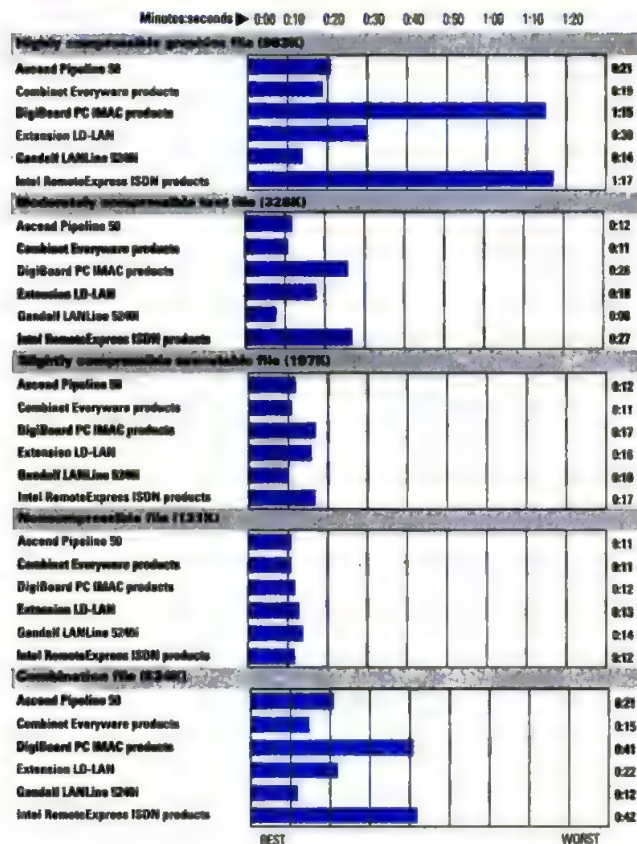
with accessing files locally on an Ethernet network.

Among the ISDN products we tested, the differentiating performance factor was compression. For non-compressible files, performance was nearly identical for all products.

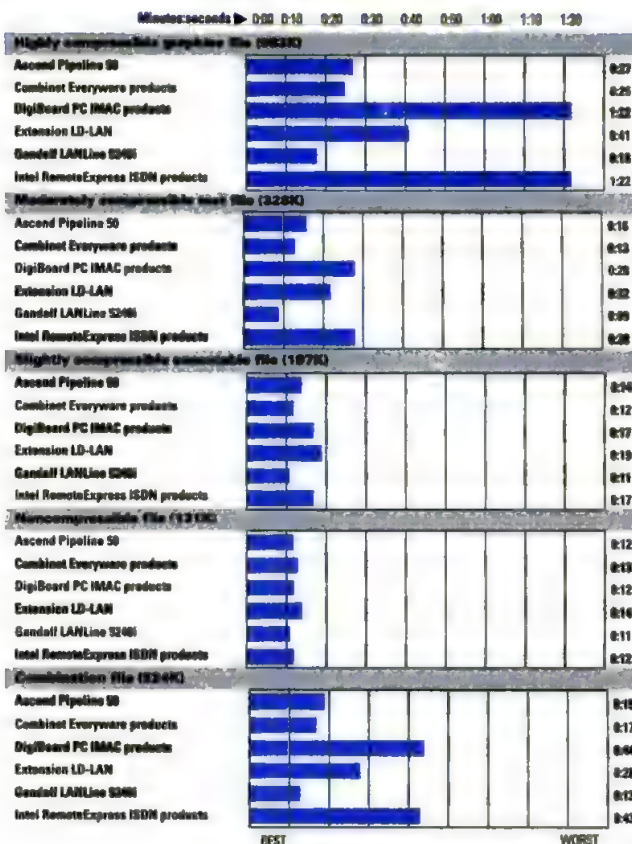
For the highly compressible graphics file, the LANLine was five times as fast as the products from DigiBoard and Intel, which had little or no compression.—*Analysis written by Tim M. Crawford*



DOS-BASED IPX FILE TRANSFERS



WINDOWS-BASED IPX FILE TRANSFERS

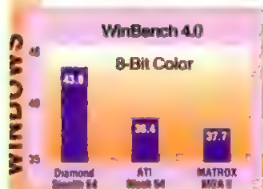


Introducing ripping fast graphics acceleration.

Diamond Stealth 64 graphics accelerators, available in VRAM and DRAM versions, combine streamlined graphics with high-performance 64-bit processing power. Our lean, clean and incredibly mean approach has paid off with flying colors.

Pumped-Up Graphics

- ◆ Curve-smashing benchmark scores: 43.0 in WinBench 4.0 for Stealth 64 VRAM; 39.4 in WinBench 4.0 for Stealth 64 DRAM
- ◆ Up to 1280x1024 high-resolution graphics
- ◆ Flicker-free, 120 Hz refresh rates
- ◆ PCI and VESA



local bus compatible

- ◆ Drivers for Windows, DOS, OS/2 and more
- ◆ List prices starting at only \$229

Powerful Productivity

Diamond's powerful menu-driven software utility, InControl Tools, offers maximum flexibility and control under Windows. This easy-to-use tool provides:

- ◆ Virtual desktop
- ◆ Real-time pan and zoom
- ◆ Energy Star™ power saving features
- ◆ Custom monitor setup
- ◆ Single key application start-up

"Stealth 64 'VRAM' blazes in every Windows and DOS application... two thumbs up for excellence in every category..."

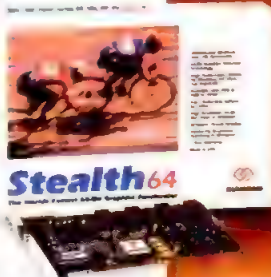
- Greg Loveria, BYTE Magazine, July 1994.

So, don't be ruled by weak-kneed performance. Get Stealth 64 from Diamond. Call **1-800-4-MULTIMEDIA** or our 24-hour FAX-Back service at **1-800-380-0030** for a dealer near you.



1130 East Arques Avenue, Sunnyvale, CA 94086

CIRCLE 176 ON READER SERVICE CARD



© 1994 by Diamond Computer Systems, Inc., using ZIBO... PCI 66MHz motherboard with 256k cache, 16MB... BIOS 6.2. The Stealth 64 VRAM was configured with... using driver release v1.06. The Matrox Ultima Plus (Model II)... using driver release 1.42. The ATI Graphics Pro... in the same mode using driver release 1.05... or registered trademarks of their respective... specifications without notice. © 1994 Diamond

How We Tested

We performed DOS-based IPX file transfers using the copy command and Windows-based IPX file transfers using File Manager. For each test, we timed the file transfer three times and averaged the results.

On the LAN side, two vendors—DigiBoard and Extension Technology Corp.—provide internal products that install in the NetWare server. Ascend, Combinet, and Gandalf provide external standalone ISDN bridges. Intel provides an ISDN adapter, the EtherExpress, and software that we loaded on our own Compaq Deskpro 486/33M.

We used a Northern Telecom NT1 that was compatible with our central office Northern Telecom DMS-100 switch. Our ISDN connections were made directly from our local RBOC, Pacific Bell, without going through our own phone switch. The ISDN lines were configured with Intel Blue compatibility.

PCMCIA or parallel-port Ethernet adapter—something the adapter-card ISDN devices cannot manage without an expensive docking module.

SEE THE DIFFERENCES

As our testing shows, these products differ principally in their throughput, manageability, and cost. There are no losers in this batch (if you don't mind the lack of interoperability), but your winner will depend on the configuration you need and your budget.

Ascend Communications Inc.

• Pipeline 50

BY TIM M. CRAWFORD

Ascend recently beefed up the Pipeline 50 with new software. The addition of NetWare functionality and channel bonding, plus a solid compression scheme, make the Pipeline a worthy contender. It is also competitively priced at \$1,695 for each end, including an NT1 and some nice management features. However, Pipeline had some difficulty handling the ISDN circuit.

We set up a Pipeline 50, with its single ISDN BRI port and a 10BaseT Ethernet port, on both the LAN and remote sites. The Pipeline 50 is an external ISDN bridge that connects via Ethernet. This connection can be a simple crossover cable if you are a single user. The cable is not included, but Ascend says it will be in future versions.

Like the external ISDN bridges from Combinet and Gandalf Technologies, you can use Pipeline to connect multiple users on an Ethernet network through a single ISDN connection. You connect one of your existing hub's 10BaseT ports to the Pipeline, and connect that port to the

ISDN port—and installation is done.

Configuration is accomplished using an RS-232-connected console; we used the Microsoft Windows Terminal. Although acceptable for initial configuration, the console requirement becomes onerous for ongoing use. An in-band Windows or DOS IPX-based application would be more helpful. If you are accustomed to TCP/IP, you may want to configure and monitor the Pipeline using telnet. Although you need a terminal, Ascend has tried to make the process of configuring the bridge more user-friendly through the use of fill-in-the-blank menus.

The documentation is helpful, with its many screen shots walking you through configuration. Interestingly, the screen is divided in half; menus are on the left, and statistics such as link status and channel usage are on the right. Ascend also provides SNMP support for monitoring and configuration.

At first, we had trouble getting the bridge to work with the B channels. Both channels would come up initially, but then one would drop off, leaving us with just a single 64-Kbps channel. Even when we were transferring large files, the second channel did not come up. With Ascend's

On the remote end, DigiBoard, Extension Technology, and Intel all provide an internal ISDN adapter. A Northern Telecom NT1 was installed between the adapter and the ISDN circuit. Ascend, Combinet, and Gandalf all require an Ethernet adapter in the remote PC. This adapter is then connected to the external bridge provided by the vendor.

In all cases, the ISDN component on the remote side conformed to NetWare's ODI stack. For the internal ISDN adapters, the typical Ethernet MLID driver was replaced by the appropriate ISDN driver. For the external products, we used the standard ODI driver for the Ethernet adapter.

We used live ISDN circuits for our testing, and the circuits provided consistent performance results at all times. We used both 64-Kbps ISDN channels for all testing, which delivered an aggregate bandwidth of 128 Kbps.

help, we made some configuration changes to get both channels working throughout our file transfers.

We saw some anomalies when resum-

ing a connection after an inactivity time-out. The Pipeline is unavailable for about 2 minutes after an inactivity time-out; other products in this roundup took just a few seconds to resume operation.

The Pipeline, like the Combinet and Gandalf products, has excellent compression techniques that gave it high marks when transferring our compressible files. The unit finished near the top on all our performance tests.

Designed initially as an ISDN bridge for the TCP/IP community, the Pipeline 50 has also become a viable ISDN solution for NetWare Ethernet networks.

Combinet Inc.

• Combinet Everyware 160 • Combinet Everyware 400

BY TIM M. CRAWFORD

Combinet's Everyware package offers compression capabilities that result in fast performance. It also includes some good features, such as call logging, password protection, and LEDs. But the manage-

► FACT FILE

Pipeline 50

List price: \$1,495; with NT1, \$1,695. **In short:** Configuring Ascend Communications' Pipeline 50 carries some difficulty—it will take you some time and trouble to get up and running. But once you've done that, this ISDN solution delivers good performance thanks to its data-compression scheme and good management features. Ascend has added NetWare functionality and channel bonding to this release of the Pipeline 50. The management interface is particularly well executed and includes statistical displays and support for SNMP. One of the complaints we had about the Pipeline 50 was some questionable handling of the ISDN circuit in our testing.

Ascend Communications Inc., 1275 Harbor Bay Parkway, Alameda, CA 94502; 800-272-3634, 510-769-6001; fax, 510-814-2300.
457 on reader service card

SUITABILITY TO TASK

Installation and configuration **FAIR**

Management **FAIR**

Dial-in **FAIR**

Suitability to Task: ISDN Products

Everyone, from the telecommuter to the network administrator at a large corporation, wants to be able to send voice, data, and video over telephone lines quickly and inexpensively. ISDN technology is one answer to that dream. ISDN is similar to but much faster than conventional analog telephone lines. Ease of use, good performance, a friendly look and feel, and management capabilities are all important for a recommendable ISDN solution.

Under **installation and configuration**, we consider the product's installation utility and the time it takes to install. We also look at the complexity of configuration on both the LAN and the remote sides. We give the highest ratings to products that have in-band configuration. In addition, the ISDN bridge or adapter should integrate into the network smoothly

SUITABILITY TO TASK	
Installation and configuration	POOR
Management	FAIR
Dial-in	GOOD

and without a lot of hassle. We note whether the ISDN product requires any additional devices, such as an NT1, and look at the number of network operating systems the product supports.

Regarding the **management** of the products, we examine what software each includes for administration and its ease of use. We rate features such as troubleshooting and trace utilities, monitoring and reporting capabilities, and scalability. We also look to see if the administrator must manage from a terminal or from a Microsoft Windows, DOS, or NetWare application. Extra points are awarded for features such as link optimization.

Dial-in capabilities are considered from the remote client's point of view; performance and ease of use are important. We also examine such features as call initiation and termination and the ability to dial multiple numbers. We give additional points to ISDN products that offer automatic call termination. The product should also have an approachable look and feel from the remote side.

ment software included has a difficult command-line, terminal-emulation interface that makes configuration cumbersome.

This ISDN solution is priced at about the middle of this pack, at \$1,190 for the Everyware 160 and \$2,190 for the Everyware 400. (We were told well after the review was completed that a Microsoft Windows-based management package called Connection Manager is available for the LAN side for an additional \$895.)

You configure the Combinet products by connecting via the serial port on the Everyware 400 LAN device to a serial port on your system. After setting the parameters for the LAN bridge, you must install and configure an Ethernet adapter in the remote system and load the appropriate software drivers.

The LAN-side bridge is connected via Ethernet 10BaseT cable to one of your hubs (the cabling is included—a nice touch). On the ISDN side here, the Everyware 400 requires an NT1 between the bridge and the ISDN line.

The remote Combinet 160 requires a LAN adapter in the remote client and that you plug the adapter directly into the external 160 bridge. On the ISDN side

here, you are not required to have an NT1 between the bridge and the ISDN line.

Also note that the Everyware package comes configured to support an AT&T switch. If you need to change the configuration to support another switch type, you must copy the information from a floppy disk instead of just resetting a parameter.

▶ FACT FILE

Everyware 160 Everyware 400

List price: Everyware 160, \$1,190; Everyware 400, \$2,190, Connection Manager, \$895. **In short:** Combinet's Everyware 160 and 400 offer good performance and some helpful features, including call logging, passwords, and status LEDs. The Everyware 160 and 400 have good compression capabilities, too, which boosts performance. But the included software is command-line driven, which makes configuration and management more difficult. You can buy Microsoft Windows software, priced at \$895, to ease the process, but that only adds to pricing that is in the middle of the pack at best.

Combinet Inc., 333 West El Camino Real, Sunnyvale, CA 94087, 800-967-6651, 408-522-9020; fax, 408-732-5479.

450 on reader service card

SUITABILITY TO TASK	
Installation and configuration	POOR
Management	POOR
Dial-in	GOOD

Combinet's call-logging feature is a plus. You can log each call event, and the Everyware package also gives you a count of events. But you cannot save the log to a file unless you purchase Connection Manager software.

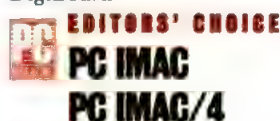
Troubleshooting is handled by placing a call on one of the B channels to the other B channel. You can enter the SH Status command to verify that both ports are connected and being used at full speed. The bridge also supports address and multicast filtering.

On the LAN side, the Everyware 400 supports the use of passwords and call-backs. You have three options for passwords: the default, which is no password protection; partial access, which will open display commands without a password; and protected access, which requires a password to access any of the commands.

The Everyware 400 has 11 LEDs; the Everyware 160 has 12. Located on the fronts of the units, these lights indicate things like channel status and LAN and line connections.

Combinet's Everyware package offers good performance and some good features. But this is not the best-priced solution here, especially considering that the Windows software is an extra \$900—and without it you're left with a difficult configuration interface.

DigiBoard

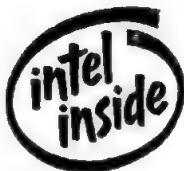


BY ROBERT P. LIPSCHUTZ

DigiBoard's solid, low-cost internal ISDN adapter integrates neatly into a NetWare environment. A better compression scheme and a client interface to match its excellent management interface would make the PC IMAC and PC IMAC/4 a complete ISDN solution—and a fantastic value. At \$795 for the client adapter and \$995 for the PC IMAC/4 multiport adapter, this product is very well priced.

The PC IMAC/4 ISDN adapter installs directly into your server; NetWare sees it as just another network adapter. Like most products in this review, each BRI connection on the PC IMAC/4 requires an ISDN network termination device. In our case, this was a Northern Telecom NT1.

How to wield power without throwing around a lot of weight



- **Lightweight** - Featuring Full Sized 83 Key Keyboard & 9.5" Display
- **Built-In 16bit DSS (Digital Sound System)** For CD Stereo Sound
- **Upgradable Monochrome, Dual Scan Passive or Active Matrix Display**
- **Choice of Intel SL Enhanced CPU's** - 486SX-33, DX2-50, DX4-75 or DX4-100
- **RAM Upgradable to 20MB**
- **Removable Hard Drive** From 200-500MB
- **1MB 32 bit VESA Local Bus Video** and Accelerated I/O.
- **Supports both NiMH and Standard AA Batteries.** Utilizes SMM and 3.3v Technologies
- **Built-In 19mm Center Trackball With Palmrest**
- **Includes External 1.44MB Floppy**
- **PCMCIA Type III**
- **User Upgradable:** CPU, RAM, Hard Drive and Display
- **Choice of 3 Optional Docking Stations:** Multimedia, Simline and Port Replicator for true Desktop Power
- **Dimensions:** 13.4" H x 8.5" D x 11" W
- **Includes:** Dos 6.21, Windows for Workgroups 3.11, Windows Sound System Software, Performance Speakers, NiMH Battery, AC Adapter and Carrying Case.
- **3 Year Warranty**

Starting At:
\$1995.00
 Monochrome 4MB RAM,
 200MB Hard Drive
 Dealer pricing may vary

Every day, you face big opponents with bigger resources. When you hook, they jab. When you punch, they counterpunch. To win it all, you need more than just another notebook computer. You need a partner who knows the ropes. A real professional. Like the SoundWave from AMS.

At under four pounds, the SoundWave is a solid lightweight. But its heavy-weight computing power is a match for any situation. Its technical qualifications are beyond question. You can start the early rounds with the solid performance of the Intel SL Enhanced 3.3 volt 486SX-33 CPU, its standard 4MB of RAM and high resolution Monochrome display. Or to go the distance, easily upgrade to the stunning power of the Intel 486DX4-75 or 100Mhz CPU, 8 or even 20MB of ram, up to 520MB of hard disk storage, and the awe-inspiring clarity of our advanced Dual-Scan or Active Matrix Color Displays.

Pound for pound, no other notebook is even a contender. And even though many in its weight class force you to settle for less, this champion gives you everything you expect in a world-class notebook.

A full sized 83 key keyboard, large 19mm center trackball with palmrest, Type III PCMCIA slot, and a full 9.5" diagonal display. Throw in our standard 1MB of local bus video, local bus accelerated I/O and Hard Drive, and you can see why the SoundWave dances circles around the competition.

This kind of performance may sound too good to be true, but you ain't heard nothin' yet. Because the SoundWave truly lives up to its name by including Full stereo 16bit digital sound for CD Quality recording and playback and comes complete with Windows Sound System software and our amazing high performance portable speakers.

Of course, we've known all along the SoundWave would be the greatest. But we found one more advantage we could give you before you step in the ring. We've added an unbeatable cover to cover - 3 year parts and labor warranty. Could someone please ring the bell now?

The SoundWave from AMS. By Unanimous Decision, a technical knockout.

Call For A Dealer Nearest You 800 267-6438

12881 Ramona Blvd. Irwindale, CA. 91706 Corp. (818) 814-8851 Fax (818) 814-0782 FaxBack Service (800) 868-8148

CIRCLE 270 ON READER SERVICE CARD

AMS

A Glossary of Terms for ISDN

By Leslie Wygant

analog A data-transfer method that uses continuously variable physical quantities for transmitting voice and data signals over conventional telephone lines. Analog transmission speed is limited by the bandwidth of the human voice.

B channel Bearer channel; A circuit-switched digital channel that sends and receives voice and data signals at speeds of 64 Kbps.

bearer services Services provided by the B channel, including digital telephony, toll-free inbound and outbound calls, circuit-switched data at 64 Kbps, packet-switched (X.25) data, and frame-relay data.

BRI Basic rate interface; The interface for connecting a desktop terminal (data) and telephones (voice) to the ISDN switch. The BRI includes two 64-Kbps B channels for simultaneous voice and data service and one 16-Kbps D control channel for call information and customer data.

bonding Bandwidth ON Demand INteroperability Group; An inverse-multiplexing method (see below) used to combine multiple channels into one single, coherent channel.

broadband ISDN A method for transmitting large amounts of data, voice, and video over long distances.

channel The path between a sender and receiver (two PCs, for example) that carries one stream of data.

circuit-switched A communications method used by the phone company to establish a dedicated path between two devices.

D channel Data channel; A digital channel that carries control signals and customer-call data in a packet-switched mode.

digital The representation of data in on/off signals of 1s and 0s. Digital transmission lines offer faster speeds, more accuracy, and better flexibility than analog lines.

full-duplex The ability for information to flow in both directions simultaneously over a communications link.

half-duplex The ability to alternate between transmitting and receiving data over a communications link.

inverse multiplexing The combination of several lower-speed circuits into one broadband circuit to give the bandwidth needed for high-speed applications. An inverse multiplexor also pulls together and synchronizes multiple channels at the receiving end of a transmission.

ISDN Integrated Services Digital Network; As defined by the ITU (see below): "A limited set of standard interfaces to a digital communications network." ISDN is capable of carrying data, voice, and video on digital circuits. It provides transmission in real time for interactive and multimedia applications and includes graphical communications interfaces.

ITU International Telecommunications Union; Previously named the CCITT (Comite Consultatif International Telegraphique et Telephonique). Leading group to develop telecommunications standards.

LEC Local exchange carrier; A provider of local telephone services.

leased line Also referred to as *private line* and *dedicated access*. A leased line offers a dedicated communications circuit for continual data transmission.

link optimization ISDN feature that prevents administration packets from opening the communications link and allows only user data to open the line. Link optimization ensures that remote connections are not kept open unnecessarily, which saves usage costs.

narrowband ISDN Voice-grade transmission at 2.4 Mbps or less or sub-voice-grade transmission from 5 Mbps to 15 Mbps.

NT1 Network terminator; The connector at either end of an ISDN link. It converts the two-wire ISDN circuit interface to four wires, for up to eight terminal devices.

on-demand dialing ISDN cost-saving feature that sets up, transfers, and closes a call only if the

ISDN device detects a data packet that is addressed to a remote network.

PBX Private branch exchange; A telephone system for a specific location (usually a business) that connects to the outside network.

PPP Point-to-Point Protocol; A protocol that provides for handling high-speed synchronous data between two devices. It allows computers to connect to a network over a serial link.

PRI Primary rate interface; The interface at each end of the high-volume trunks linking PBX and central-office facilities or connecting network switches to each other. PRI transmits using 23 64-Kbps B channels (with maximum speeds of 1.544 Mbps) and one 64-Kbps D channel.

RBOC Regional Bell Operating Company; The seven regional telephone service providers formed by deregulation: Ameritech, Bell Atlantic, Bell South, NYNEX, Pacific Bell, Southwestern Bell, and US West.

SS7 Signaling system number 7; Provides fast call setup and remote database interactions.

supplementary services Services above basic requirements, including fast dialing, calling line ID, call waiting, call forwarding, and videoconferencing features.

Switched 56 Digital service at 56 Kbps provided by local telephone companies and long-distance carriers.

switched access Also called a *dial-up line*. Switched access provides connection on an as-needed basis.

teleservices Services offered across communications links. Includes e-mail and facsimile features.

terminal adapter An ISDN phone or a PC card that emulates the phone. It connects a non-ISDN terminal to an ISDN network.

voice line A communications link usually limited to transmitting data at the bandwidth of the human voice.

▶ FACT FILE

PC IMAC PC IMAC/4

List price: PC IMAC, \$795; PC IMAC/4 with one BRI interface, \$995; additional BRI interfaces (up to four can be added), \$795 each. **In short:** The DigiBoard PC IMAC and PC IMAC/4 ISDN solution is a solid, low-cost answer to your ISDN needs. These two products integrate well into either a Novell NetWare or Microsoft Windows NT network. An easy-to-use Windows management program makes installation smooth, providing you with such useful information as channel status. This ISDN solution is well-priced, at \$795 for the client adapter and \$995 to \$3,180 for the PC IMAC/4 multiport adapter. A more effective compression algorithm would give DigiBoard's PC IMAC and PC IMAC/4 ISDN solution better performance, as would a better client interface to match that of the network end.

DigiBoard, 6400
Flying Cloud Dr.,
Eden Prairie, MN
55344; 800-344-
4273, 612-943-9020;
fax, 612-943-5398.

458 on reader service card

SUITABILITY TO TASK	
Installation and configuration	GOOD
Management	GOOD
Dial-in	GOOD

An intuitive Microsoft Windows-based management program guides you through configuration and provides useful monitoring information, such as the channel status. Parameters are clearly laid out; complicated ISDN parameters are hidden.

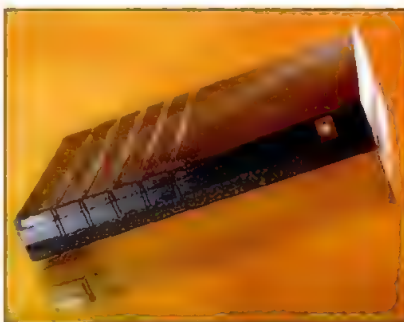
Each remote client requires a PC IMAC ISA adapter. After running through a quick software installation and modifying a provided batch file, we were ready to use ISDN. The installation creates a batch file that loads the NetWare ODI drivers with an ISDN-adapter driver.

Although the PC IMAC and PC IMAC/4 are simple to install, their default configuration is not optimal. The useful Link Optimization feature is off, for example, and no inactivity time-out is set at the client. These are cost traps for those with ISDN services billed by the minute. To change the configuration we had to experiment a bit while wading through the documentation. Some configuration examples would help.

Because you'll want to minimize the amount of time you are connected, DigiBoard provides IPX Link Optimization for managing the automatic initiation and termination of ISDN calls. And, so that you don't have to manually initiate and terminate calls, Link Optimization accounts for NetWare overhead packets and

■ Equipment for Moving Heavy Data Across ISDN Lines

Products for connecting your PCs and network over ISDN are designed as external or internal devices. Three of the vendors—Ascend Communications, Combinet, and Gandalf Technologies—designed a network-connected box. The other three ISDN solutions are built as expansion cards for your PC. The external solutions require a LAN adapter, while the internal devices do not.



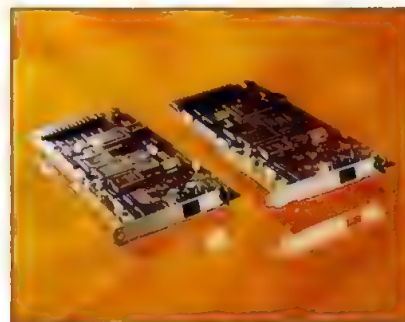
Ascend Communications' Pipeline 50 has five status LEDs and a friendly user interface. This external unit offers a competitive price and a solid compression scheme.



Combinet's Everywhere package is an external bridge combination; it offers an approachable design, including LEDs and good security capabilities.



DigiBoard's PC IMAC and PC IMAC/4 package is easy to integrate into your NetWare network. It is also well priced and offers a good user interface.



Extension Technology Corp.'s LD-LAN package offers easy installation and configuration and easy-to-use but limited management features.



Gandalf Technologies offers a sleek house for its LANline 5240i ISDN solution, including status LEDs and helpful statistical displays for the console.



Intel Corp.'s RemoteExpress ISDN package supports a variety of operating systems, but it is missing some features such as data compression and 802.2 frame support.

■ One Man's ISDN Travails

By John C. Dvorak

Anyone living in a rural area might expect that getting ISDN would be difficult. But it's difficult in many urban areas too. Phone companies have taken forever to implement ISDN, and many seem as if they still don't care.

I recently had my run-ins with a couple of local phone providers as I attempted to connect two homes together with ISDN. One house is on the Olympic Peninsula in Washington state, the other is in Northern California—within a few miles of the University of California at Berkeley.

I knew that getting connected in Washington would be difficult, because US West is the service provider. US West spends money on all sorts of experimental projects at the same time it lets its local phone business stagnate.

In fact, you cannot get ISDN in most parts of Washington state. I couldn't get it; if I wanted even the mediocre Switched 56 service, I'd have to pay for a special line to be run from Seattle. When I chatted with a sales representative at US West who sold ISDN, he told me it was depressing to be responsible for selling the service, because there was nothing to sell.

Actually, that wasn't 100 percent true: Microsoft had complained so bitterly about lack of ISDN that US West put an ISDN system in the Redmond area just for them. Too bad for the rest of the state's customer base. Moreover, why should Microsoft be the only privileged software company in a state laced with competitors? Something else for people to complain about, I guess.

Meanwhile, in the Berkeley area, Pacific Bell had plenty of Switched 56 setups, but ISDN is only now generally available. Pac Bell says it will find a way to get ISDN to you even if the local switch is inadequate. I'll know

how well this works soon. My friends in other parts of the country also complain bitterly about lack of ISDN. Most Baby Bells are like US West, it seems.

EXCUSE CENTRAL

When you quiz phone companies about ISDN and its lack of implementation, you hear a lot of excuses.

Here's the top five:

- 1) We're still testing it.
- 2) Nobody wants it.
- 3) We can't implement it because we don't know what to charge for it.
- 4) There are better technologies ahead.
- 5) What's ISDN?

A variation on the last excuse comes for our editor-in-chief, Michael J. Miller, who wanted ISDN in Connecticut and was told flatly, "You can't have that—it's illegal!" This kind of reaction is part of a bigger problem. When you start asking about ISDN, you soon discover that few people in the phone company know anything about it or even know what it is. When they *have* heard of it, you are usually talking to "ISDN specialists."

The other excuses are bogus, too. ISDN has been tested to death. And the idea that nobody wants it is a self-fulfilling prophecy brought about by companies trying to avoid implementation. How would you answer this question: "Would you pay more money for a digital phone system that will provide very little in the way of new services to the average user?" This is a good way to get people to be ambivalent about ISDN. But ask the same people if they would like to have inexpensive full-motion videophones, computer-software downloading services, and free E-mail, and I suspect they'd at least be interested in the idea.

The other excuses, like not knowing what to charge, are idiotic. The excuse

that there is a new technology around the corner, which is the untested ATM technology, will be a gleam in the phone companies' eye until 2010 or so.

WHAT TO DO? WHAT TO DO?

Some companies, such as Pacific Bell, seem sincere in their efforts to install ISDN in their service area. Other Baby Bells and local service providers, such as US West, seem content to squander the profits made from local phone service on money-hungry projects, such as video-on-demand or even cable TV.

I don't want to harp on the obvious, but we are a nation that must compete with Japan, Germany, and other countries that rely on communications to do business. ISDN seems much more important than renting movies or watching more TV. It's as if these companies are looking for an excuse to get out of the local phone service business. I know that MCI and other long-distance carriers would love the franchise in Washington state. So I say give it to them.

As someone pointed out to me, the entire country is crisscrossed with a digital network. All long-distance service is digital. The only analog part left in the system is the line from your home to the local switch. So we go analog for a mile or so, digital for 2,500 miles, then back to analog. Is this ridiculous or what? What good is digital service when the two ends of the connection are clogged by an old analog phone switch?

It's been over a year since I began my pursuit of ISDN for my homes. As of this writing, I still have none. What's more annoying is that there is always some fellow who lives in some backwater burg in North Dakota and who tells me he has ISDN. "I've had it for 5 years," he says. "It was done as a test market." I say it's time for us to complain—and to complain bitterly. □

Take **PC Magazine**

Announcing PC Magazine CD – the new way to access cutting-edge PC information!

Presenting the all-new **PC Magazine CD** — the perfect on-screen companion to your printed issues of **PC Magazine**.

Every quarterly release of **PC Magazine CD** is packed with special enhanced versions of important articles that literally “come to life” with point-and-click interactive screens, instant product demos, exclusive software walkthroughs, “how-it-works” animation, video, and much more!

PC Magazine CD gives you expanded coverage of today’s hottest PC topics not available anywhere else — all in a unique cutting-edge interactive format. It’s a hands-on tool that lets you access the most important articles, benchmark tests, product specifications and charts from

PC Magazine right from your desktop — quickly and easily.

You’ll also run benchmark tests on your own system and see how it compares with top performers. You’ll see special on-screen, side-by-side comparisons and actually hear reviewers as they test and critique new products.

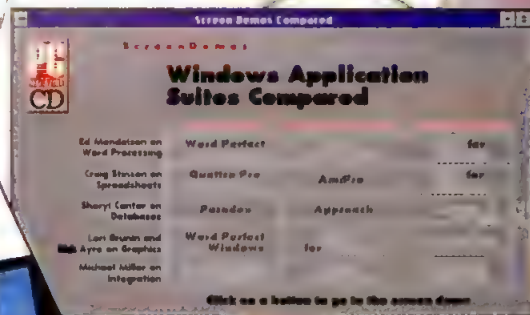
PC Magazine CD comes complete with the full text of every article published in **PC Magazine** during the previous 12 months — plus powerful “super-searching” software to help you find the facts you need instantly!

Act now and you’ll enjoy exclusive Charter Subscriber savings. You get four power-packed releases of **PC Magazine CD** for just \$59.95 — and save 25% off the single-copy price. Just call 1-800-787-9677 now to get the next release rushed to you.

PC Magazine CD — it’s an incredible, interactive way to get even more out of **PC Magazine**!

Supplies are limited — so start your Charter Subscription to **PC Magazine CD** now!

**CHARTER
SUBSCRIPTION
SAVINGS
OFFER!**

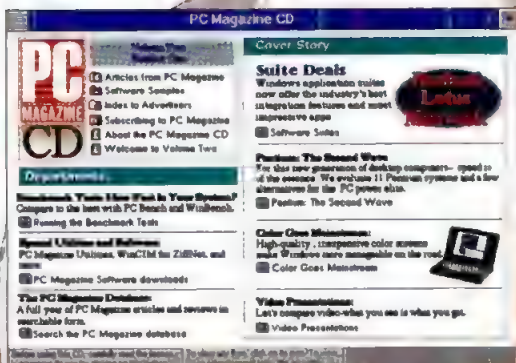


**CALL TO ORDER NOW!
1-800-787-9677**

Mention Priority Code:

4K26

out for a spin



Here's just a sample of the kind of unique information you'll get in every issue of

PC Magazine CD:

- ✓ full text of **every** article published in PC Magazine during the previous 12 months — plus an ultra-fast search engine
- ✓ interactive **walkthroughs** of new software
- ✓ revolutionary on-screen **demos** of new technologies
- ✓ one-click access to performance **benchmark** testing programs
- ✓ bonus **utilities** to boost your performance and productivity
- ✓ exciting **ads and demos** from leading hardware and software firms
- ✓ on-screen **presentations** featuring the PC Magazine editors



Get one-year of PC Magazine CD
(4 quarterly releases)
for just \$59.95.

Use your Visa, MasterCard or
American Express account.



CALL TO SUBSCRIBE

**1-800-
787-9677**

Mention Priority Code:
4K26

Toll free number is available in
the United States and Canada.

Other countries, call

303-447-9330

Or fax your order to

303-443-5080

SYSTEM REQUIREMENTS: PC Magazine CD is designed to run on a 386 or higher PC-compatible with Windows 3.1, 4MB RAM and a CD-ROM drive. Windows-compatible soundboard recommended for certain functions.

The single-copy price of PC Magazine CD is \$19.95. PC Magazine CD is \$71.95 outside the U.S. (includes Canadian GST and shipping charges.)

PC MAGAZINE CD • P.O. Box 59494 • Boulder, CO 80322-9494

makes the ISDN connection transparent to the end user. You hardly notice any difference from a permanent connection.

One part of Link Optimization—IPX header compression—does not, however, work with the NetWare VLM drivers. DigiBoard is working on a solution, and we were able to disable this feature selectively during our testing.

Like all other products in this review, the PC IMAC supports bonding of the two ISDN channels for a combined 128 Kbps of bandwidth. That's about eight times more than a typical V.32bis modem, and you really notice the difference on large files. But compression was not very effective on our highly compressible graphics file test; the PC IMAC lagged far behind products with better compression schemes. For less compressible files, the PC IMAC performed about the same as other solutions.

Well-priced and easily integrated into a NetWare environment, DigiBoard's PC IMAC is a solid ISDN solution. Some sprucing up would increase its appeal.

Extension Technology Corp.

• Long Distance LAN Adapter E-101

• Long Distance LAN Adapter E-201

BY ANATOLIY NOSOVITSKIY
Extension Technology Corp.'s ISDN products look and feel like a local network solution, with their simple installation, configuration, and management. They require no special dialing interface or communications program; however, the management features are limited, and the suspend/resume feature needs some fine-tuning.

By default, the Long Distance LAN Adapter E-201 (for the LAN) and E-101 (for a remote client PC) combination (LD-LAN) uses automatic data compression, and it performed solidly on our data-transfer tests. At \$1,195 list for the E-101 and \$1,495 list for the E-201, they are priced well for such sites.

Installation is kept to a minimum. You can use a server-to-remote-PC connection (which Extension recommends). Both units are full-length 16-bit ISA cards and can be installed in any PC (client or server) with an ISA or EISA bus slot; the E-101's drivers are for the remote client, while the

■ IBM's Analog/Digital Twist

By Leslie Wygant

The IBM WaveRunner is a variation on the ISDN theme of our main roundup. It works in conjunction with IBM's LAN Distance remote server but provides ISDN access plus standard phone-line access through modems—all in the same system.

The WaveRunner is interoperable with any COM port-compatible modem (14.4 Kbps or under). At \$545 for the ISA version and \$575 for MCA, this package costs about half the price of these ISDN products. So if you want to use both your existing network analog modems and fax modems and move to high-speed ISDN adapters and bridges, IBM's WaveRunner digital modem offers an economical alternative.

There are a couple of caveats. First, the WaveRunner uses only one serial port to connect to the system, which limits its ISDN transmission speeds to 64 Kbps. It is a dial-up modem but does not provide on-demand dialing, unlike the ISDN solutions in the main review. At present, compression is available only for analog. IBM plans a software upgrade

this fall that will add data compression for both ISDN and analog transmission, as well as packet-level bonding.

The IBM WaveRunner has a BRI interface and supports one 64-Kbps B channel for data and one 16-Kbps D channel for signaling. It requires a 386SX-based or better PC with Microsoft Windows 3.1 or later or OS/2 2.1 or later. And you'll need to provide your own NT1.

The LAN Distance package offers users remote access to network files and links branch offices to the main network. It has management features such as security and a good graphical interface.

IBM provides a one-year warranty with the WaveRunner. Its documentation includes procedures for installation and configuration and an appendix for integrating the WaveRunner with the LAN Distance. □

► **WaveRunner.** List price: *ISA version*, \$545; *MCA version*, \$575. IBM Networking Systems, *Research Triangle Park, NC 27709*; 800-426-2255; fax-back, 800-426-3395.

Circle 490 on reader service card

E-201 has LAN drivers. LD-LAN requires an NT1 for each end of the ISDN link.

The installation procedure creates two configuration files, one for local and one for remote-node definitions. Each includes a set of DOS parameters that you can view or modify. No interface is included, but you can use any text editor.

LD-LAN offers a limited set of management, troubleshooting, and diagnostic utilities for the file server and the remote client. These include a control utility for remote PCs, a test utility that verifies hardware and checks configuration files for syntax errors, a log file that holds status data, and a handy channel-usage profiler that determines ISDN line use and estimates monthly costs.

The suspend/resume feature terminates the connection when there is no data traffic. By default, it is enabled and set to 120 seconds. Broadcast traffic can prevent

► FACT FILE

Long Distance LAN Adapter E-101 Long Distance LAN Adapter E-201

List price: Long Distance LAN Adapter E-101, \$1,195; Long Distance LAN Adapter E-201, \$1,495. **In short:** Extension Technology Corp.'s Long Distance LAN Adapter E-101 and E-201 gives you similar qualities to a local network solution—simple installation, configuration, and management. The LD-LAN delivers strong performance with simple installation and configuration, making this product well suited for connecting small installations. Its management features, however, could use some polishing and expansion.

Extension Technology Corp., 30 Hollis St., Framingham, MA 01701; 800-856-2672, 508-872-7748, fax, 508-872-7533.

460 on reader service card

SUITABILITY TO TASK

Installation and configuration	GOOD
Management	GOOD
Dial-in	GOOD

▪ Tales from ISDN Pioneers

By Steve Buehler

Videoconferencing! Fast remote access! Work at home and get in-office response times from your network!

The *PC Magazine* Networking Team heard these promises and jumped on the ISDN bandwagon. While the availability of ISDN increases daily, we encountered many disconnects in our early efforts to reach out and digitally touch someone.

ROCKSLIDES EARLY ON

When we started out last year, our first task was to get videoconferencing to work between *PC Magazine's* New York and Foster City, California, labs. Our initial optimism about the technology led us to planning a videoconferencing demo between the labs at NetWorld+Interop in Dallas as part of a technology briefing we were scheduled to give.

Although the demo did eventually work (we ended up using Switched 56 circuits), we ran into many obstacles during installation, setup, and trial runs. Incompatibilities between telephone service providers slowed us down, the beta software we used to get full-color displays worked only when it wanted to, and switching from "talking heads" to "sharing documents" during the presentation took nearly a full minute. We ended up with a brief—although flashy—video that showed videoconferencing was riding down the ISDN trail.

At the NetWorld+Interop show in Las Vegas this past May, we tried another videoconference. This time the leading edge of technology involved multiple concurrent participation between users in New York, Foster City, and Las Vegas. Getting ISDN to the labs and the hotel went reasonably smoothly, but new villains appeared.

We found it impossible to get clear-channel (64-Kbps) service from one

region to another. If we stayed within a telephone switch or provider area, we got our clear channel; going to other areas through AT&T, MCI, or Sprint networks dropped us to 56-Kbps restricted channel service. Worse yet, our test software had a defect that let it ask for 64 Kbps and negotiate down to and accept 56 Kbps—then fool the network provider into thinking it was still a 64-Kbps channel. Great.

Following some heated conversations with telephone-switch programmers the night before our demo for several hundred people, we got the local telephone-switch software patched to handle this situation until our demo was completed.

We also got a good lesson in *provisioning* for our trouble. Our early ISDN use led us to believe that provisioning was something arcane the telephone company did to circuits and switches to ensure interoperability among products. But our testing showed that most products are incompatible with products from other vendors. It turns out that phone companies use provisioning on ISDN lines to make sure you get only the services you've committed to pay for.

After a few moderate successes, we started rolling out ISDN through our organization. But when several senior editors and labs staff asked their local telephone providers for service, they were told to expect delivery anytime from 2 months to 2 years later.

WHERE ISDN IS TODAY

Today, you can call your local phone company to ask for ISDN availability. Even some ISDN equipment vendors, such as Intel, offer information (for example, Intel's ISDN BBS at 503-645-6275). But in our installation attempts, we found many central offices that are not yet digital. So, while it's still early, you may have to wait or request that the phone company string special

service from the nearest digital central office to your house.

Pacific Bell now offers home ISDN service, complete with a great user information guide (in California, call 1-800-472-4736 to request the guide). Moreover, Pac Bell attempts to ease your installation woes by selling products guaranteed to work with each other. Users can, of course, install whatever they want in Pac Bell's area if they're willing to work with the company to get the provisioning and other issues right.

Pac Bell is also charging mere peanuts for actual ISDN service. Except for a hefty fee encouraging you to maintain the service for two years, prime time usage rates are 4 cents for the first minute and 1 cent per minute after that. Another sign of maturation is that ISDN test tools are available. Merge Technologies Group (in Napa, California) now offers an ISDN simulator to test and analyze connection traffic.

After all this, we now have ISDN videoconferencing between our New York and Foster City offices, and we use it regularly. Remote access via ISDN to some of our homes is expected soon. We've found the videoconferencing great for one-on-one meetings and nearly as good for smaller group meetings but not as effective for large groups. In addition, the etiquette of waiting 2 to 4 seconds for speech transmission has led us to mute our video system and use a telephone for voice in our more fast-paced brainstorming meetings.

Though ISDN still has a ways to go, the progress made by vendors and telephone providers to deliver working solutions has been significant. We can already see the advances in ease of setup and use. The ISDN wagon train may have gotten off to a very slow start, but its momentum seems to be building each day. □



CP60p Desktop



CP60b Mini-Tower

***Lower Prices.
Faster Processors.
Greater Value.***

The awesome power and lightning speed of Pentium™ processors have changed the pace and the face of computing today. Greater power. Faster speed. And now...lower prices.

We've just reduced the prices of our Pentium systems across the board. From our high-powered desktops to our top-of-the-line towers. And if you're working with power-hungry applications like graphics, multimedia or CAD/CAM, now you can run them at the speed you've been wishing for. At a price you've been hoping for.

Pentium™ Power. Powerful Savings.

You'll also get something you probably wouldn't expect for such a low price. A helping hand. Because when you call us, you don't talk to an order-taker. You speak with a problem-solver...a professional trained to help you determine your needs before making your purchase. And that can be particularly valuable if you're new to the world of Pentium.

We'll help you configure the precise system you need for the peak performance you want...and our 10-point guarantee assures you of a risk-free CompuAdd system. Which is another reason to move up to Pentium power at powerful savings!



- ☐ 30-Day Money-Back Guarantee
- ☐ 30-Day Price Protection
- ☐ One-Year Onsite Service
- ☐ One-Year Limited Warranty
- ☐ Out-of-Warranty Repairs
- ☐ Lifetime BBS Support
- ☐ Lifetime Technical Support
- ☐ Onsite Installation Option
- ☐ Remote Rescue Online Support
- ☐ Environmentally Sensitive Packaging



CP60p Desktop

CPU	Intel 60MHz Pentium
RAM	8MB
Cache	256KB
Hard Drive	212MB
Expansion	8 Slots, 3 with PCI
Monitor	14" N-I
Video	1MB PCI
CD ROM	Optional
Fax/Modem	No

CP60p Mini-Tower*

CPU	Intel 60MHz Pentium
RAM	8MB
Cache	256KB
Hard Drive	420MB
Expansion	8 Slots, 3 with PCI
Monitor	15" N-I
Video	1MB PCI
CD ROM	Dual Speed MPC2 Compliant
Fax/Modem	Yes

CP90p Mini-Tower*

CPU	Intel 90MHz Pentium
RAM	8MB
Cache	256KB
Hard Drive	420MB
Expansion	8 Slots, 3 with PCI
Monitor	15" N-I
Video	1MB PCI
CD ROM	Dual Speed MPC2 Compliant
Fax/Modem	Yes

CP90p Tower

CPU	Intel 90MHz Pentium
RAM	16MB
Cache	256KB
Hard Drive	1GB SCSI
Expansion	8 Slots, 3 with PCI
Monitor	14" N-I
Video	1MB PCI
CD ROM	Dual Speed MPC2 Compliant
Fax/Modem	No

All Systems Include: 101-key Keyboard, Microsoft Mouse, 3.5" Floppy, MS DOS 6.2, Windows for Workgroups 3.11, CompuServe Starter Kit... and More!

**Price
Lease**

\$2,195
\$80/mo.

\$2,299
\$83/mo.

\$2,599
\$94/mo.

\$3,895
\$138/mo.

** Special configuration to give you the best value! Call for additional pricing on your own custom configuration of these or any other CompuAdd® product.*



To Order Or To Receive A Free Catalogue
Call (7am - 7pm CST)

1-800-456-3660
Fax 512/331-2862

CompuAdd
CUSTOMER DRIVEN, BY DESIGN.

12337 Technology Boulevard
Austin, Texas 78727
CIRCLE 126 ON READER SERVICE CARD

©CompuAdd Corporation 1994. Prices and specifications are subject to change without notice. CompuAdd is not liable for damage due to omissions or typographical errors. The Intel Inside logo is a registered trademark of Intel Corporation. All other brand and product names are trademarks or registered trademarks of their respective companies.

► SUMMARY OF FEATURES

ISDN Products



Products listed in review order

■ = YES □ = NO

Remote product

LAN product

Remote product.

List price

Platform

Network terminator (NT1)

LAN product.

List price

Platform

Network terminator (NT1)

Maximum number of BRI ports per adapter

CO-Switch Support

AT&T 5ESS

National ISDN-1

NT1 DMS 100

Link Control

Bonding

Compression

Falls back to lower data rate

Handles NetWare packets

Inactivity time-out/Activity resume

Manual initiation/termination

Voice-capable

NOS Support

Microsoft Windows for Workgroups 3.11

Microsoft Windows NT Advanced Server 3.1

NetWare 3.x/4.x

VINES

Certifications

FCC Class B

UL/CSA

Protocol Stacks

NDIS

ODI

Technical Support

Free with purchase

Hours (eastern time)

Phone number

Ascend
Communications
Inc.

**Ascend
Pipeline 50**

**Ascend
Pipeline 50**

\$1,695

Standalone

Internal

\$1,695

Standalone

Internal

1

■

■

■

■

■

■

■

■ ■

■ ■

■

■

■

■ ■

■

■

■

N/A²

N/A²

■

9:00 A.M.–
11:00 P.M. M–F¹

800-272-3634

Combinet Inc.

**Combinet
Everyware 160**

**Combinet
Everyware 400**

\$1,190

Standalone

Internal

\$2,190

Standalone

External

1

■

■

■

■

■

■

■

■ ■

■ ■ ■ ■

■

■

■

■ ■

■

■

■

N/A²

N/A²

■

9:00–9:00 M–F

408-522-4600

DigiBoard

PC IMAC

PC IMAC/4

\$795

Client PC

External

\$995

NetWare server

External

20

■

■

■

■

■

■

■

■ ■

■ ■

■

■

■

■ ■

□

N/A¹

■

■

■

8:30–7:00 M–F

800-344-4273

Extension
Technology
Corp.

**Extension Long
Distance LAN
Adapter E-101**
**Extension Long
Distance LAN
Adapter E-201**

\$1,195

Client PC

External

\$1,495

NetWare server

External

4

■

■

■

■

■

■

■

■ ■

■ ■

□

□

□

■ ■

□

■

N/A¹

□

■

■

8:00–6:00 M–F

800-856-2672

Gandalf
Technologies
Inc.

**Gandalf
LANLine 5240i**

**Gandalf
LANLine 5240i**

\$2,495

Standalone

Internal

\$2,495

Standalone

Internal

1

■

■

■

■

■

■

■

■ ■

□ □

■

■

■

■ ■

■

■

■

N/A²

N/A²

■

8:00–8:00 M–F

800-426-3253

Intel Corp.

**Intel Remote-
Express ISDN
LAN Adapter**
**Intel Remote-
Express ISDN
Bridge Pack^{*}**

\$499

Client PC

External

\$2,199

Dedicated PC

External

3

■

■

■

■

□

■

■

□ □

■ ■

■

□

■

■ □

■

■

N/A¹

■

■

■

10:00–8:00 M–F

503-629-7000

* The Bridge Pack includes the LAN Adapter and the EtherExpress 16 Ethernet adapter

** This product's link is initiated or terminated via terminal emulation or remote log-on

¹ A 24-hour paging service is also available

N/A¹—Not applicable. The adapter is installed directly on the PC's bus. N/A²—Not applicable. This product uses NIC drivers and does not require special drivers

connections from being suspended, since LD-LAN does not provide special algorithms or filters to prevent broadcast packets from being sent over the ISDN link. If you change the time-out parameter, be forewarned that a low value could suspend the connection too often, and a high time-

out could prevent suspensions altogether.

The NetWare file server maintains three log files (for alarms, events, and exception conditions) to help troubleshoot and keep track of events. LD-Monitor and LD-Control utilities (both in NLM format) allow you to view statistics, and con-

nect to and disconnect from remote nodes.

LD-LAN automatically provides data compression, which contributed to its strong performance on our tests. Though a few of its features could use some polishing, this ISDN solution is still well suited for smaller installations.

▪ A Jack of All Trades

By Robert P. Lipschutz

Some technologies are special enough to change the way we work and live. ISDN is one, and it's becoming more available. If you live in an ISDN-ready area, you'll want to take advantage of its benefits.

TELECOMMUTING

When you think telecommuting, you should think ISDN. With its ability to carry both voice and data at high speeds, ISDN is the hands-down choice for connecting to the office network from home. Although not as fast as a local connection, ISDN is impressive compared to analog lines.

VOICE

A few features of ISDN may turn your head—for example, its one-button forwarding and transferring of calls to any other ISDN phone regardless of location. And you need not worry about calling people who still are using

the regular public switched telephone network (PSTN): they are all hooked together.

VIDEOCONFERENCING

You've seen the commercials with the businessman standing on a beach taking part in a videoconference with his office. That's happening over ISDN. Although you won't confuse the quality of the image with that of your television set, it's good enough to make you think about what you're wearing that day.

Several products include application-sharing programs that permit collaboration on an electronic document while you're meeting "face-to-face."

LAN-TO-LAN CONNECTIVITY

Much less expensive than dedicated leased lines and faster than Switched 56 and analog circuits (with shorter call setup times), ISDN is excellent for

connecting small LANs. ISDN also can be a backup for dedicated leased lines that connect corporate networks. Depending on the cost in your area, ISDN might be the technology to connect geographically separate LANs.

JUMPING ON-LINE AND ONTO THE INTERNET

Think about the time it takes right now to download a 1MB file from CompuServe or America Online—about 10 minutes with a 9.6-Kbps connection. That same file would be on your system in 60 seconds with ISDN. (Those large graphics files will no longer be snack breaks.) But you'll have to wait for the on-line services and Internet providers to jump on board with ISDN—and they'll probably charge you more. This might take a while (if experience is any indicator), but eventually you'll be able to use ISDN devices just like you use your modem. Take the digital leap as soon as you can! □

Gandalf Technologies Inc.

• LANLine 5240i

BY CHUL SUNG KIM

Small workgroups in remote offices that need a fast, virtually transparent link to the corporate headquarters LAN will be well served by Gandalf Technologies' LANLine 5240i. This ISDN bridge sets itself apart with strong data compression and a solid feature set. But its pricing is high (\$2,495 with a built-in NT1, \$2,395 without), and it has an exasperating interface.

Each LANLine can be configured to use its two 64-Kbps ISDN channels to connect with two other LANLines, or to use both channels to provide a single 128-Kbps link. You can determine exactly how the unit schedules allocation of the second channel: at all times, only when traffic on the primary channel reaches a specified threshold, or only when the primary channel malfunctions. If you're using TCP/IP, you can telnet into the

bridge to configure it.

Indicator lights on the bridge itself, as well as status fields on the main console

► FACT FILE

LANLine 5240i

List price: \$2,395; with NT1, \$2,495. **In short:** Not the best choice for an individual user, Gandalf Technologies' LANLine 5240i is much better suited for connecting small workgroups in remote offices. The LANLine gives you a fast link to the main office LAN. An excellent compression algorithm (for great speed), a virtually transparent link (once configured), and good management features almost compensate for the unit's awkward interface and steep price. Information is spread across the screen and is not intuitive. Gandalf does not offer you an easy way to disconnect the LANLine—you have to unplug its power cord. The model we tested includes a built-in NT1, but you can buy the LANLine without it if you choose.

Gandalf Technologies Inc., Cherry Hill Industrial Center-9, Cherry Hill, NJ 08003; 800-426-3253, 609-461-8100; fax, 609-461-5186.

401 on reader service card

SUITABILITY TO TASK

Installation and configuration	FAIR
Management	FAIR
Dial-in	GOOD

screen, tell whether either channel is currently in use. Even better, statistical displays for each channel include a running measure of bandwidth utilization—a feature network managers will no doubt appreciate. A comprehensive event and error log completes the monitoring picture.

An inactivity time-out can be specified from 1 to 99 minutes for each channel. Unfortunately, Gandalf did not provide a straightforward means of disconnecting manually—short of unplugging the LANLine's power cord. Incredibly, the unit lacks a power switch (Gandalf says it plans to ship a unit this fall with a manual connect/disconnect feature and a power switch.)

Restoring the link is automatic, and the LANLine can spoof RIP, SAP, and KeepAlive packets to keep the connection from being reestablished needlessly. But administrators beware: There is an inadequately documented feature (which we at first mistook for a bug) that stops spoofing KeepAlive responses after a

user-specified time (10 minutes by default). If you try to access the remote LAN after that time, the ISDN link is restored—but you receive network error messages, since the distant server will have cleared the user from memory.

The one real complaint we had about the LANLine is its management interface, which uses a direct terminal connection via a serial cable. No DOS or Microsoft Windows interface is offered. Configuration parameters are spread over several screens in an unintuitive fashion. Screen updates and responses to key presses are extremely slow, even at 9.6 Kbps. Network managers would be wise to configure and test remote LANLines thoroughly before flying back home.

The LANLine's compression algorithm was the best in this roundup, enabling it to post file-transfer times much less than those of bridges using less capable compression or no compression at all. Except for its management interface, the LANLine is a solidly designed solution.

Intel Corp.

● RemoteExpress ISDN LAN Adapter

● RemoteExpress ISDN Bridge Pack

BY ANATOLIY NOSOVITSKIY

Even with its built-in support for multiple operating systems, Intel Corp.'s ISDN solution lacks some features. It does not compress data, so it was slower than most products here, and it requires a lot of memory. Moreover, the RemoteExpress ISDN package does not currently support the NetWare 802.2 frame type; thus it may be unacceptable for some installations.

The RemoteExpress ISDN Bridge Pack lists for \$2,199 and includes the RemoteExpress ISDN LAN Adapter and the EtherExpress 16 Ethernet adapter. LanDesk traffic-analyst software for Microsoft Windows and DOS is also included.

The LAN-side hardware runs in a dedicated 486-based PC with direct connection to the network backbone. The same ISDN

card can be used for the PC or to add more bridge ports. It supports a single remote node or two concurrent remote nodes over a two-channel ISDN line; up to three adapters can be installed in the dedicated PC. You must use the EtherExpress 16.

The RemoteExpress ISDN LAN Adapter, priced at \$499, can be installed in a home or branch office PC as a single card with an ISA connector. The minimum requirement for the remote client is 550K of conventional memory (including network drivers). Intel recommends at least 600K and that you run this bridge on a dedicated machine.

From a remote-client perspective, the RemoteExpress ISDN LAN Adapter runs network software as if it were directly attached to the LAN. The ISDN board comes with software that works with Novell's NetWare (except 802.2), Banyan's VINES, some TCP/IP software, Microsoft LAN Manager, IBM's OS/2 LAN Server, and Artisoft's LANtastic.

The custom configuration utility performs simple diagnostic functions for the hardware and ISDN line. The time-out feature has a minimum of 1 minute and is only effective in systems without a network redirector, such as TCP/IP. Two statistical utilities for Windows and DOS display the status of ISDN call activity.

Manageability of the ISDN bridge is limited. RemoteExpress ISDN loads in and uses almost all available conventional memory. The amount of memory is so critical that the bridge is not fully functional while in monitor mode.

The RemoteExpress ISDN package allows SNMP-based configuration and management from another network node. The ISDN LAN Adapter automatically produces a call-tracking log in ASCII format that is viewable from any text editor.

This solution was slow due to its lack of data compression. It supports a range of operating systems but lacks important features and requires dedicated PCs on either end of the connection. □

Smart, Simple Printer Sharing

- Connects from 3 to 32 computers and printers
- DOS/Windows compatible
- High speed and error free even at 1200'
- No software changes required
- Simple installation. Just plug SmartPrint modules into your computer and printer parallel ports and snap in the supplied wires. That's it!

Questions?

Call us at **1-800-368-7737**
(Outside US/Canada 909-945-5600)
or for instant info by fax call 24 hrs
1-800-373-3600 and ask for #1012



Order from any computer dealer. Distributed to dealers by Ingram Micro and Tech Data.
Made in USA by Dresselhaus
GSA Scheduled • 3 year warranty



	Part Number	Suggested Retail
Starter Kit for 2 computers/1 printer	PSN1	\$199
Add-on Computer Module ..	PSN2	59
Add-on Printer Module	PSN3	69

► FACT FILE

RemoteExpress ISDN LAN Adapter

RemoteExpress ISDN Bridge Pack

List price: RemoteExpress ISDN LAN Adapter, \$499, RemoteExpress ISDN Bridge Pack, \$2199 **In short:** A slow performer on our benchmark tests due to its lack of data compression, Intel's RemoteExpress ISDN package targets telecommuters who need access to information on the corporate network backbone. The combination offers support for multiple operating systems but lacks some important features and requires a lot of memory—in fact, dedicated machines. The RemoteExpress ISDN solution does not currently support the NetWare 802.2 frame type, so it might not work with some installations.

Intel Corp., 2200 Mission College Blvd., P.O. Box 58119, Santa Clara, CA 95052; 800-538-3373, fax-back, 800-458-6231.

462 on reader service card

SUITABILITY TO TASK

Installation and configuration	GOOD
Management	FAIR
Dial-in	FAIR

Network Edition



The latest network
products
and management
techniques

First Looks

► DESKTOP VIDEOCONFERENCING

What You See (and Write) Is What You Get

New versions, new features, and better quality. Is it time for videoconferencing?

By O. Ryan Tabibian

Over the past four months, three key videoconferencing players—IBM, Intel, and InVision—shipped new versions of their systems. These maturing products offer buyers new options and hot features. Perhaps the most critical have less to do with videoconferencing itself than with the ability for individuals in a workgroup to collaborate on documents.

In order to see how far we've come with the new additions to the market, we tested them against our previous Editors' Choice (See "Seeing Is Almost Believing," June 14, 1994), the AT&T Vistium Personal

Video System 1300 (formerly the AT&T Telemedia Personal Video System).

We found that each of the new releases provides users with some enhancements worth considering. IBM Corp.'s Person to Person for OS/2 and Windows, Version 1.0.3, was previously available for OS/2, but it is now available for the Windows environment. The new version, 1.6, of Intel Corp.'s software for the Intel ProShare Personal Conferencing Video System 200 adds application sharing to its features list, and InVision Systems Corp.'s InVision, Version 3.0, broadens a user's options with support for more videoconferencing hardware and for IPX.

What's more, with the exception of

Continues on page NE5



More than just a pretty face.

INDEX

First Looks

Netwave CreditCard Adapter.....	NE17
StreetMeter 3.0	NE18
WinInstall 4.0.....	NE22
Office Logic for Windows 1.37	NE27
OnTime Enterprise for Novell NetWare 1.12.....	NE30

New & Improved

ISDN support for Cisco Systems routers.....	NE33
Distributed Enterprise Management Architecture	NE33
Communique Control Server	NE33
Communique Remote Control Server.....	NE33
TribeLink.....	NE35
VFX/40.....	NE35
HyperSwitch A100	NE35

Technology Spotlight

A Compressing Situation.....	NE37
------------------------------	------

Dorfler & Greenfield

Is Notes Headed for the Obit Page? ...	NE39
--	------

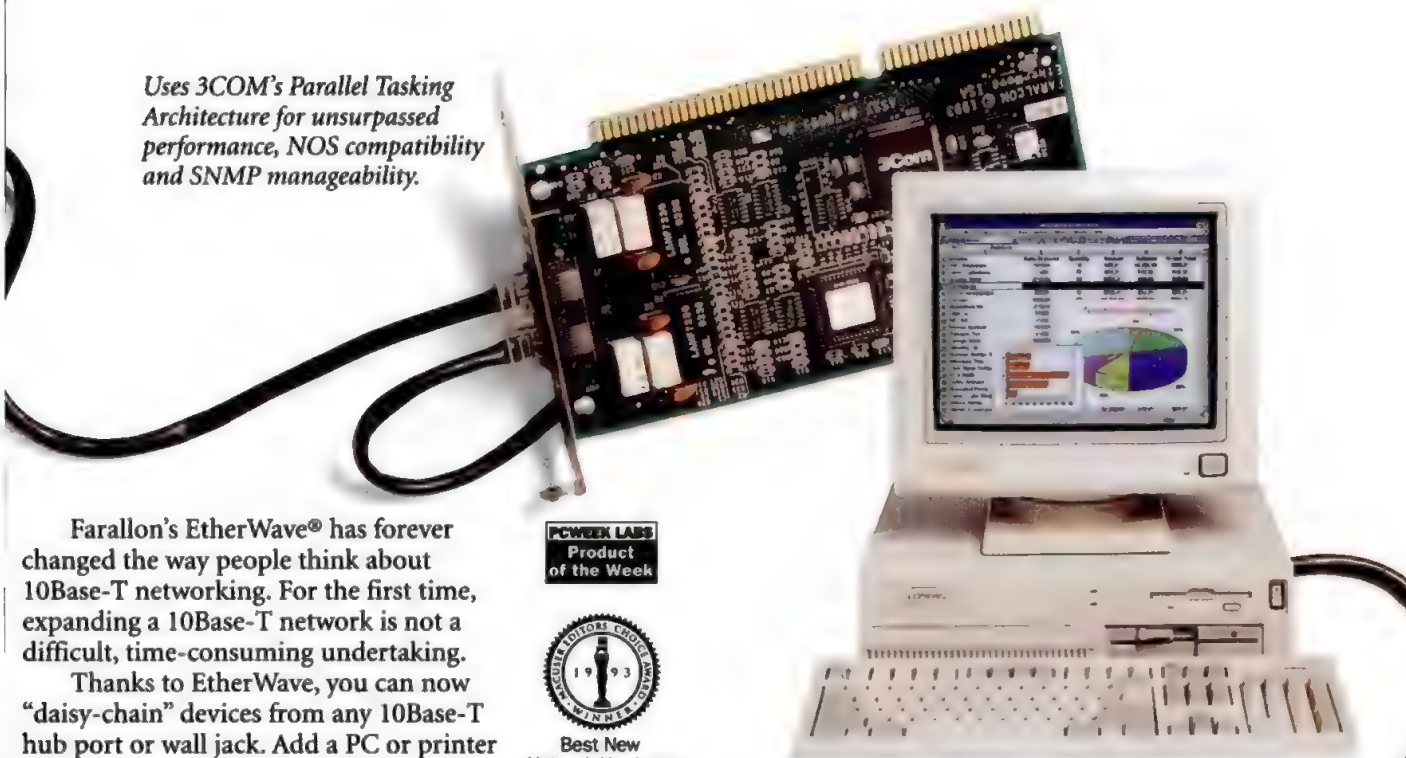


WE SET OFF THE BIGGEST CHAIN REACTION IN ETHERNET HISTORY.

*With EtherWave cards, adapters and transceivers,
you can add computers or printers to your network
in moments, without pulling more wire.*



Uses 3COM's Parallel Tasking Architecture for unsurpassed performance, NOS compatibility and SNMP manageability.



Farallon's EtherWave® has forever changed the way people think about 10Base-T networking. For the first time, expanding a 10Base-T network is not a difficult, time-consuming undertaking.

Thanks to EtherWave, you can now "daisy-chain" devices from any 10Base-T hub port or wall jack. Add a PC or printer in minutes. Connect a PC notebook without working up a sweat. Or quickly set up a small network without a hub. Finally Ethernet expansion is, literally, a snap.

Best of all, EtherWave is 100% 10Base-T compatible and uses 3COM's Parallel Tasking. No wonder our EtherWave ISA card tied with 3COM's EtherLink III card for top performance among PC network interface cards, as reported by PCWeek Labs.

Of course, Farallon's EtherWave is also compatible with all leading network operating systems, including NetWare, LAN Manager, Windows NT, Windows for Workgroups, LANtastic, and PC/TCP. And it's fully SNMP manageable, so you can monitor EtherWave devices anywhere on your network, even at remote sites.

PCWEEK LABS
Product of the Week



Best New Network Hardware

PCWEEK LABS
Overall scores
4.0



Hardware Product of the Year



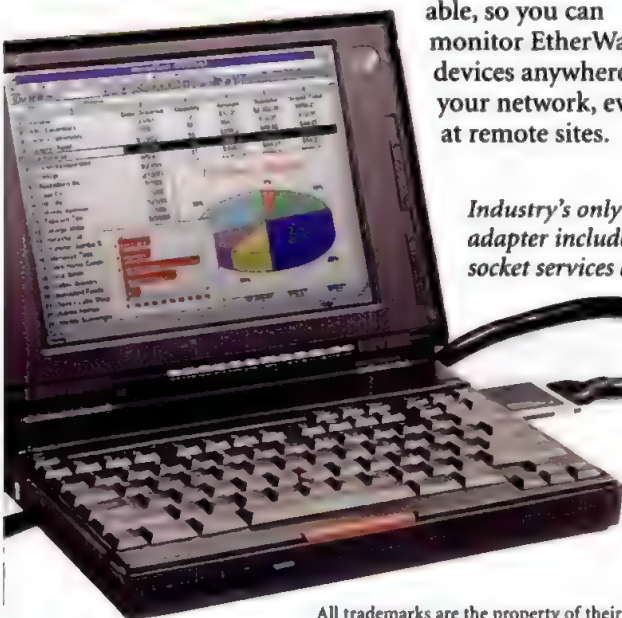
Farallon

React now. Call 1-800-949-7761 Ext. 4 for your FREE EtherWave Info Kit!

To receive information by fax, please call 1-510-814-5040. Outside the U.S. and Canada, please call Farallon at 1-510-814-5000 or fax 1-510-814-5023. CompuServe ID: Farallon 75410,2702; Internet ID: info@farallon.com; Internet World Wide Web server: <http://www.farallon.com>.

Farallon
EtherWave
Info Kit

Industry's only 2-port 10Base-T PCMCIA adapter includes hot-swapping, card and socket services and 3COM's Parallel Tasking.



Storage Made Simple.. Go Configure..

While Novell Netware®, Sun® and SCO™ UNIX® users take odds on what tomorrow will bring, data-intensive applications continue to hoard storage at an alarming rate. Which is precisely why Digital™ created StorageWorks™—an entire line of SCSI-2 based products designed to give you the most flexible means ever to configure and expand your disk, tape and optical storage capacity. So now, as long as you can slide a drive into a SCSI-2 backplane; your specs can change as quickly as your needs. And because all StorageWorks products are modular and scalable, it's never been easier to protect your investment in the future. It's that simple. Like to find out more? Also simple.

Just call 1-800-STORWORK.

Storage **W**orks™

Solutions from Digital Equipment Corporation



Desktop Videoconferencing

CONTINUED FROM NE1

InVision, which sells the software, but allows you to choose from a list of third-party hardware, the products each provide you with some of the hardware you need to get up and running. AT&T includes a camera—compliant with the National Television Standards Committee (NTSC) transmission standard (administered by the FCC)—for recording your image; hardware such as a video-capture board or software for compressing and decompressing the image; a sound card for playing the conversation; an ISDN adapter for connecting to the other videoconference site and a PC. Intel provides a camera, video-capture board, a sound card, and an ISDN adapter. IBM includes only a video-capture board.

The software included in these packages varied. We found that the products differed in their video quality, frame rates, and sound quality. In fact, IBM was the only vendor in this roundup that did not include audio: You'll have to use your phone.

An important software consideration is the whiteboard and application-sharing features you'll find in each of these packages. These are helpful when you need to collaborate on documents. You'll need to pick between the two tools as needed. Whiteboard software lets you share bit-mapped images of files. It's great for illustrating points as you would on a nonelectronic whiteboard. All of the vendors offered this type of software.

With application-sharing software, you don't share a bit-mapped image; you share the application. This lets you make changes and annotations in a document on the fly. In fact we used the application-sharing features of these packages to edit this story, between our offices in California and New York, a process that at first was cumbersome but proved to be extremely useful. Only AT&T and Intel include application sharing.

In all, we found that AT&T's Vistium offered the best blend of video quality, true application sharing, and whiteboarding. Intel's ProShare was also impressive. While the ProShare's video quality was not as good as that of the Vistium, this new version of ProShare adds solid appli-



• AT&T Vistium Personal Video System 1300

Looking for a videoconferencing system that combines high-quality video with excellent application sharing and whiteboarding? Then the AT&T Vistium Personal Video System 1300 is your only choice. The Vistium, winner of *PC Magazine's* Editors' Choice in the June 14 issue (then called the

AT&T Telemedia Personal Video System) still offered the best video of the bunch. The Vistium was also the only package here to support the Common Intermediate Format H.320, a set of ITU (International Telecommunications Union) standards that allow videoconferencing products to interoperate. There is a price to pay though. The Vistium may cost almost twice as much as the Intel ProShare Personal Conferencing Video System 200.

The ProShare also combines high-quality video and application-sharing capabilities. Its price may be somewhat deceiving since the system needs at least a Pentium-based PC to give you

adequate performance. We were able to use the Vistium on the 486/66 PC with 8MB of RAM, which it was bundled with.

Less impressive were the LAN-based videoconferencing products. Of the two, InVision, Version 3.0, was the stronger pick. Both InVision and IBM's Person to Person for OS/2 and Windows. Version 1.0.3, lack application sharing, which is disappointing. IBM's lack of support for sound and InVision's poor sound quality can be bothersome as well. Both products are also bandwidth hungry and are not well suited for use over leased lines such as a partial 64Kb T1 line.

cation-sharing to its existing whiteboarding features and a simple and intuitive user interface. Without support for application sharing, neither InVision nor Person to Person were serious contenders for the Network Edition Editors' Choice.

IT STARTS WITH THE NETWORK

Where do you start when you want to buy the right videoconferencing system? The logical jumping-off point is your network. Today's products are bound to particular types of infrastructures—LAN, ISDN, and analog lines. Business users will probably consider LAN- or ISDN-based products. Home users will be interested in analog-based products.

InVision and Person to Person are aimed at the LAN environment; they run over Ethernet and Token-Ring networks. These products can often strain any Ethernet network. We found that a single video session can consume between 500

kilobits per second (Kbps) to 1.2 megabits per second (Mbps) of sustained network bandwidth per session. But how often do you want to videoconference with someone on your own LAN? Unless you are in a campus or single building, at some time your videoconferencing will run over a WAN link. So we simulated a 56-Kbps connection between two sites. And we watched the video slow to a painful crawl. For example, IBM's Person to Person isn't designed for ISDN, but it can support it—at about one frame per second.

We felt that businesses would be more likely to use one of the ISDN-based products—AT&T's Vistium or Intel's ProShare system. With ISDN, users can videoconference with remote offices. Still, ISDN is in its infancy. Unlike ordering leased lines, ordering the proper ISDN lines can be difficult in some regions of the country, and of course with any public

Continues on page NE6

Desktop Videoconferencing

CONTINUED FROM NE5

connection total monthly charges will typically be higher than the initial hardware cost. For more information on ISDN see "Betting on the Dream," in this issue.

The third and smallest group of products (not reviewed in this issue) are analog videoconferencing systems, such as Specom Technologies Corp.'s Picfon System and MRA Associates' VidCall, Version 5.67. These products offer poor video quality due to the limitations of analog lines. Several vendors, however, are working on implementing an inverse multiplexed solution that lets you use multiple high-speed modems to get better quality video.

Once we selected the network, we considered the quality of the video picture as well as the number of sites supported simultaneously on a single videoconference call.

None of these packages have video quality that would make you equate them with a broadcast TV image. The video just isn't that good. Some though are better than others. The differences largely come down to the frames per second (fps) rate, resolution, and bits per pixel. Frames per second is the number of times that the video is refreshed each second; for example, a broadcast TV picture is 30 fps. Resolution refers to the size of the window, and bits per pixel is the color depth. Most products offer between 7 to 20 fps with resolutions ranging from 160-by-120

to 352-by-240 with 8 bits per pixel. In most cases, the higher the frame rate, resolution, and bits per pixel, the better the quality of the video.

Another factor you might want to consider is multipoint support. Multipoint support allows you to conference simultaneously with more than one party. Both IBM's Person to Person and AT&T's Vistium offer multipoint support. With multipoint support, however, you can only see one party at a time and either you have to switch manually between the different video channels or use voice activation as AT&T does.

Videoconferencing can be ideal for meetings, but in certain instances the ability to share applications or do whiteboarding takes precedence over seeing someone's face. For example, in preparing this article, we used videoconferencing to conduct meetings, but when we were editing the text the video link became less important.

In assessing whiteboarding we looked at four areas of features: powerful annotation tools, an easy-to-use interface, OLE support, and the ability to save the annotations. All of the products in our roundup offer these features; all have differences. Overall, we found AT&T's interface to be the easiest to use, and the product offered the greatest variety of annotation tools.

When it came to evaluating application-sharing software, we looked for two things: real-time application sharing—not

just using OLE hooks—and a variety of annotation tools. These features are supported by both AT&T and Intel. Pens and drawing tools are the means for annotating. We found that AT&T offers better tools than Intel does.

What kind of PC will you need to run videoconferencing? It comes down to the video codec, the PC's configuration, and the type of network interface. The codec, or coder/decoder, converts analog to digital signals, and it can run either in hardware or, in a less-expensive implementation, as software. If the product is using a hardware-based codec, as the Vistium and Person to Person do, then you can get away with a low-end PC such as a 486/33. But if the product is implementing a software-based codec, as Intel's ProShare and InVision do, then we'd suggest a high-end Pentium-based PC with at least 16MB of RAM.

Ideally, the product you select will interoperate with other videoconferencing systems. In order to do that you'll need to be sure that the product complies with H.320, an International Telecommunication Industry (ITU) standard that defines interoperability between video and voice, mainly for ISDN and conference-room solutions. The ITU has not yet defined a standard for document sharing or for LAN-based products. Of the products reviewed, only AT&T's Vistium supports H.320. Intel is expected to release an H.320-compliant product by the time that you read this article.

Continues on page NE8

Suitability to Task:

Desktop Videoconferencing

High-quality video tends to be what most people use to judge a videoconferencing system. While we agree that the quality of the video is a determining factor, we also consider each system's whiteboard-application capabilities and installation important in choosing a videoconferencing system.

Video In judging video quality we consider the maximum number of frames per second (fps), sound quality, and video adjustment, as well as the maximum bandwidth utilized in LAN-based products. Normally any product with fewer than 10 fps is

not acceptable, since the image becomes very choppy and it tends to look like a still image rather than a moving picture. We factor in sound quality, taking into account both pitch and the video-to-sound synchronization. Bandwidth utilization is important if you are running on a standard shared environment such as Ethernet.

Whiteboard/application sharing What distinguishes desktop videoconferencing from a shared image is whiteboard and application-sharing capabilities. Whiteboard software, which is the most popular method of collaboration on desktop,

SUITABILITY TO TASK

Video	EXCELLENT
Whiteboard/application sharing	GOOD
Installation	FAIR

allows you to view and edit a bit-mapped image that is pasted into the whiteboard software. Application sharing, a more advanced version of whiteboarding, lets you share any application on the desktop. In judging this task, we look for extensive annotation tools that include a feature for saving annotations.

Installation While installation might not be the first thing you consider when buying a videoconferencing system, it is one that merits some attention. To install a videoconferencing system you need a variety of items such as a camera, video-capture board, sound card, and network adapter to work together. It is important that the vendor provide an installation routine that lets you easily integrate all the pieces of the puzzle.



With all this talk about network printing, QMS CrownNet makes sense of it all!

Continuing its role as industry leader in network printing, QMS® proudly announces CrownNet™—simultaneously supporting and accommodating all major network interfaces and major protocols on a single network connection. CrownNet technology provides true enterprise network printing. And that's not just idle chatter! You can lower per-user, equipment, maintenance and training costs by better utilizing workgroup processing resources.



Network administrators can now remotely configure QMS Crown™ print systems from anywhere on the network with CrownNet's remote console capability. CrownNet makes high quality print resource sharing a reality, allowing you the time to concentrate on building truly competitive enterprise networks. Follow the leader to the first real "enterprise level," CrownNet-enhanced network printers. Call 800 972-6708 Dept. 4039 for more information.



For service on QMS and other products, call 800 762 8894 (U.S.) • Q-Fax 800 633-7213
E-mail: info@qms.com • Canada 800 263-5508

Nobody Delivers Seamless Network Printing Like We Do.

QMS, the QMS logo, CrownNet and Crown are trademarks or registered trademarks of QMS, Inc. One Magnum Pass, Mobile, AL 36618, 205 633-4300

CIRCLE 899 ON READER SERVICE CARD

Desktop Videoconferencing

CONTINUED FROM NE6

With these factors in mind consider the products on the following pages and answer for yourself: Is videoconferencing right for you?

NETWORK EDITION

EDITORS' CHOICE

AT&T Global Information Solutions

• AT&T Vistium Personal Video System 1300

The AT&T Vistium Personal Video System 1300 is a mature ISDN videoconferencing system in a market that is still in its infancy. The Vistium, winner of our Network Edition Editors' Choice, is the most complete product here. It combines superb video quality with complete application-sharing software and whiteboard support in a single easy-to-use package. It's also the only reviewed product that supports the ITU's H.320 standard for interoperability between videoconferencing systems. There's just one catch: This level of quality comes at twice the cost of its closest competitor—Intel's system.

With its high-quality video—15 frames per second (fps) and 320-by-240 resolution—the Vistium surpassed any other product here. This is mainly because AT&T's hardware-based codec (coder/decoder) is faster than the software-based codecs used by Intel and InVision. Compared to the other prod-

ucts, the Vistium offers impressive audio-to-video synchronization that imposes very little latency. The benefit is that there is little time delay between what you see and what you hear. Unlike the others, the Vistium cannot display both local and remote video, which can be limiting.

What distinguishes the Vistium, aside from its superb video, is its whiteboard and application-sharing capabilities. It supports a variety of standard whiteboard functions such as user annotation and collaboration on documents. The Vistium, along with Intel's entry, offers application-sharing software that lets you share a variety of apps regardless of where they reside.

The tested version of the Vistium came preinstalled on a 486/66 PC along with a camera, a speaker, an ISDN adapter, and a double-width video-capture board. Installation consisted of simply connecting the system to the ISDN line: a two-step process. First we had to configure the correct ISDN number in the control panel, and then we contacted our local telephone company to

What's Your Best Fit?

Analog Systems

Creative Labs Inc.	ShareVision PC 300	408-428-6600
Spectrum Technologies Corp.	TelePro System (formerly Pic Ion System)	408-982-1880
Video Conferencing Communications Inc.	TeleView 1000C	714-452-0800

ISDN

AT&T Corp.	AT&T Vistium Personal Video System 1300	800-943-3646
EyeTel Communications Inc.	Communicator 130 Communicator II 30 Communicator III 30	800-736-3236
GTE Vantage Solutions	GTE Desktop Video Teleconferencing System 1.04	703-818-4000
Intel Corp.	Intel ProShare Personal Conferencing Video System 200	800-538-3373
Northern Telecom Inc.	Visit Video 2.0	800-667-8437
PictureTel Corp.	PictureTel Live PCS 100	800-716-6000
Video Conferencing Communications Inc.	TeleView 2000 TeleView 4000 TeleView Professional	714-452-0800

LAN Systems

Datapoint Corp.	MINX Local Area Network	210-593-7866
Fujitsu Networks Industry Inc.	DeskTop Conferencing 1.5	800-446-4736
IBM Corp.	IBM Person to Person for OS/2 and Windows 1.0.3	800-426-9402
InSoft Inc.	Comunique	717-730-9501
InVision Systems Corp.	InVision 3.0	703-506-0094
MRA Associates Inc.	VidCall 5.67	703-448-5373

Conference Room Systems

Compression Labs Inc.	eclipse	800-538-7542
PictureTel Corp.	PictureTel System 1000	800-716-6000
VTel Corp.	VTel 115 VTel 117 VTel 127	800-856-8835

check that the configuration of our ISDN lines matched AT&T's requirements. Unlike Intel, AT&T requires special ISDN parameters.

Overall, the Vistium was the best desktop videoconferencing system that we have seen to date. If you are looking for a system and you have access to ISDN, Vistium's impressive list of features and superb video make it the top choice.

IBM Corp.

• Person to Person for OS/2 and Windows, Version 1.0.3

IBM Corp. has an interesting entry into the videoconferencing market. Person to Person for OS/2 and Windows, Version 1.0.3, is a LAN-based system that, unlike the rest of the products here, does not

Continues on page NE12

▶ FACT FILE

AT&T Vistium Personal Video System 1300

List price: \$4,995 **In short:** The AT&T Vistium Personal Video System 1300 is the most complete product that we reviewed. Its excellent video quality is well complemented by superb application sharing and whiteboard applications, making it the product of choice if you are in the market for videoconferencing and document-collaboration software. Its main drawback is its high cost.

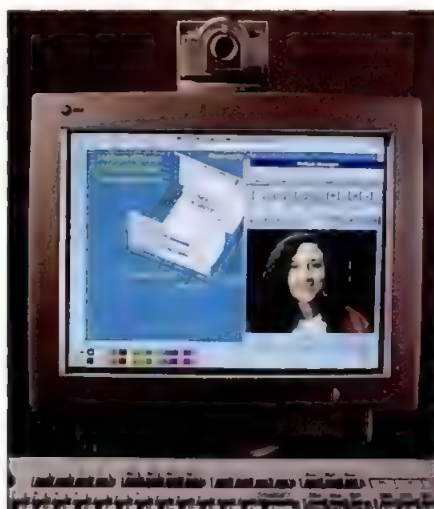
AT&T Global Information Solutions, 1700 S Patterson Blvd., Dayton, OH 45479; 800-225-5627; fax, 513-445-5000

963 on reader service card

SUITABILITY TO TASK

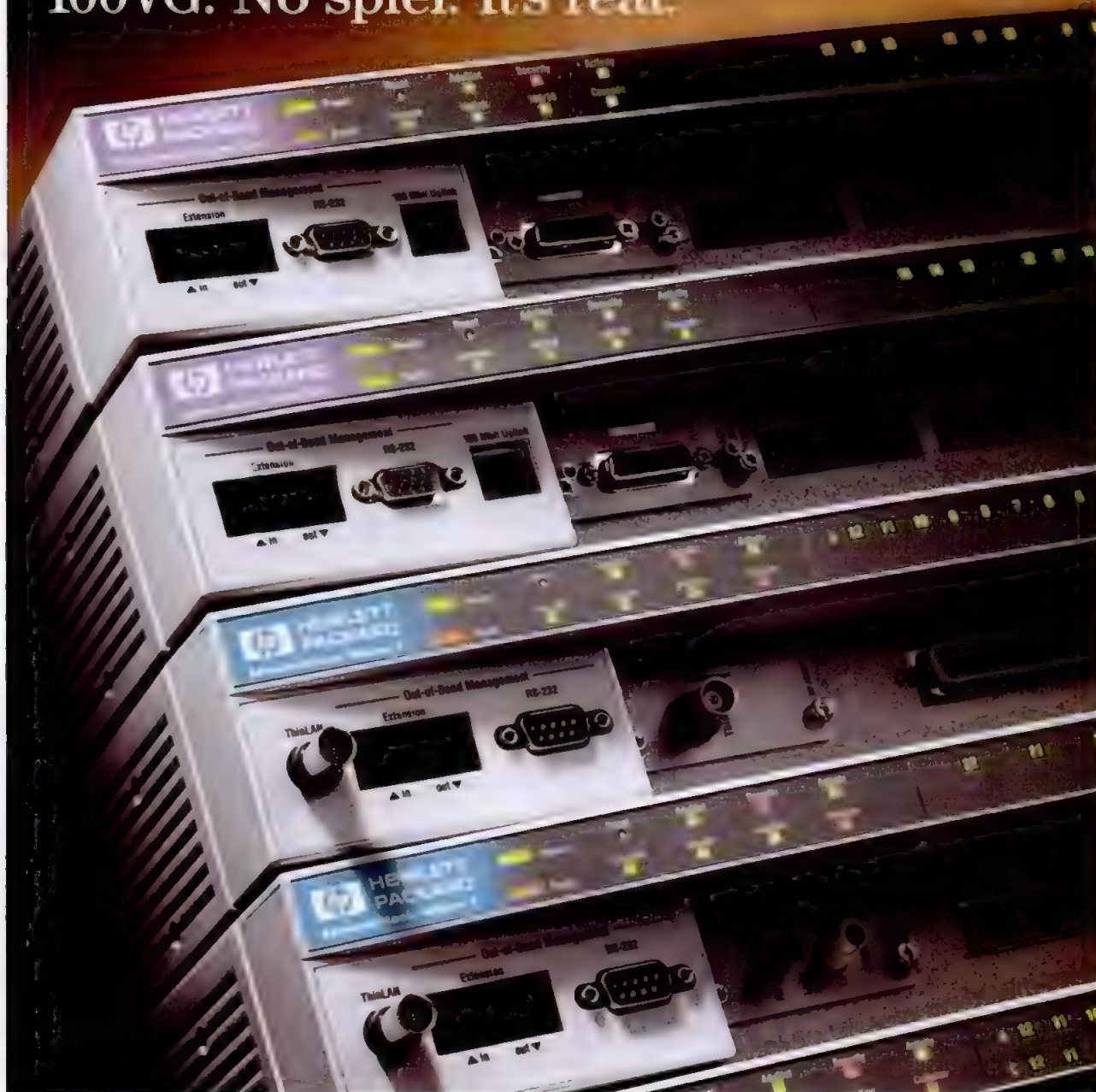
Video	EXCELLENT
Whiteboard/application sharing	EXCELLENT
Installation	N/A

N/A—Not Applicable: The tested unit's hardware and software were preconfigured.



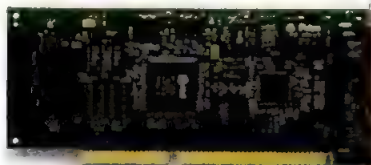
LET'S VISIT: Vistium lets you collaborate using whiteboard and application-sharing software.

100VG. No spiel. It's real.



Bring 100Mbit/s to the desktop today, with HP's family of 100VG products.

There's a lot of talk about high-speed networks, but unfortunately, most of it's been just that—talk. At HP, we think it's time to cut through the hype and deliver a viable high-speed solution you can work with today. So no more chitchat, here's the real deal:



Our 10/100Mbit adapters leverage your existing investment in 10Base-T Ethernet, and allow you to choose either 10Mbit/s or 100Mbit/s for the speed of your LAN.

- 100VG products available now (ISA and EISA 10/100Mbit adapters, 15-port hub, and 100Mbit bridge/management card)
- Fits in your existing Ethernet network with little or no re-investment
 - Preserves all existing cabling (including 100Mbit CAT 3 or 5), eliminates need for new cabling
 - Preserves all existing 10Base-T network topologies
 - Works with major network operating systems (NetWare, LAN Manager, Windows for Workgroups, Windows NT)
 - Supported by industry standard SNMP management programs, including HP OpenView
 - Advanced traffic analysis capabilities with HP EASE Sampling
 - Supports IEEE 802.4 Ethernet frame types
- 100VG-AnyLAN Demand Priority technology does more than speed up your LAN, it
 - Eliminates network collisions
 - Optimizes throughput
 - Guarantees a higher level of security
 - Minimizes delay for time-sensitive applications
 - Guarantees network access
- Priced to implement now*
 - \$349 ISA 10/100Mbit adapters, \$449 EISA 10/100Mbit adapters
 - \$3,750 15-port hub

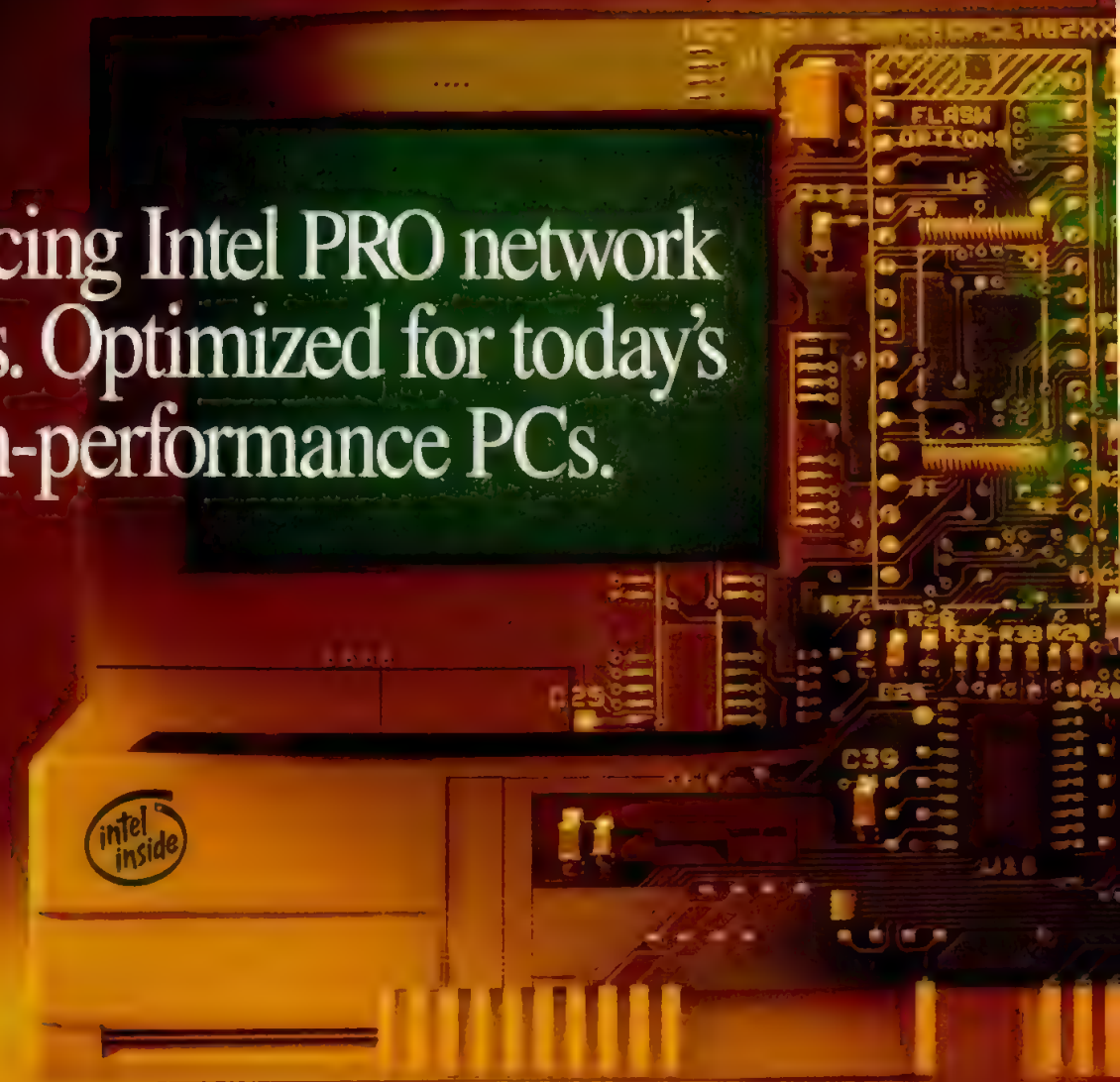
Perhaps best of all, these products come from HP, as part of our AdvanceStack family of networking solutions. For fast faxed information, call 1-800-964-1843, or for more information, 1-800-533-1333, Ext. 8463! Just say you want the facts, and nothing but.

Another smart networking product from HP.

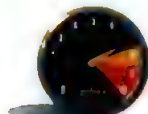


*U.S. list price as of 10/1/94. 1 In Canada call 1-800-387-3867, Dept. 8463. Windows is a U.S. trademark of Microsoft Corporation. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited. ©1994 Hewlett-Packard Company

Introducing Intel PRO network adapters. Optimized for today's high-performance PCs.



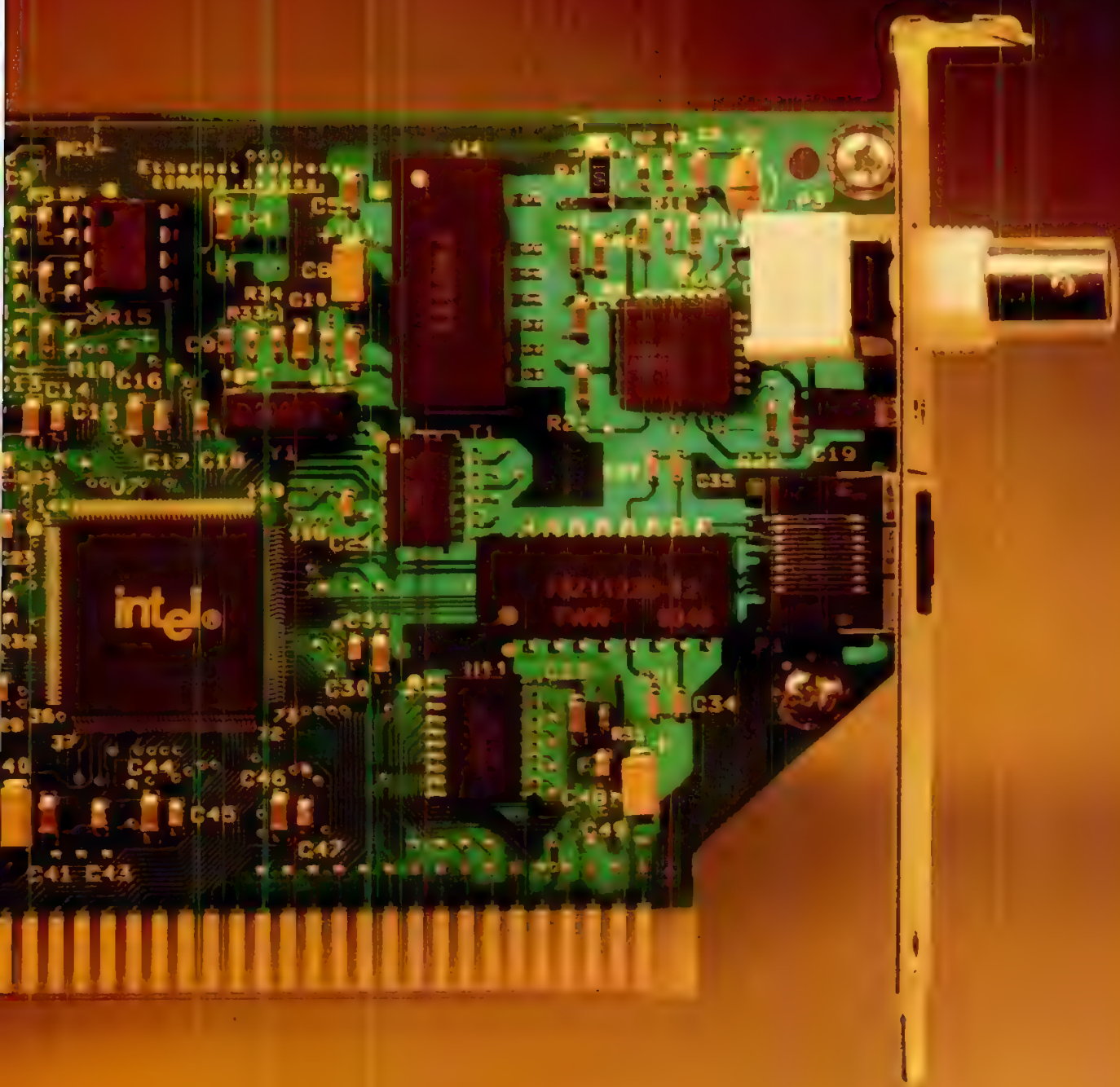
NEW INTEL PRO NETWORK ADAPTERS
are uniquely designed for Intel486™ and
Pentium™ processor-based PCs.



*They optimize PC LAN performance
with large 32kByte buffers, 32-bit drivers
and Concurrent Processing.*



*They fit major environments,
including new 10/100Mbps Fast
Ethernet and 10Mbps Ethernet.
Plus, they're DMI-ready.*



© 1994 Intel Corporation. This document is the property of Intel Corporation and its subsidiaries.



Many come with management tools,
like auto-sensing installation,
centralized driver update and pre-boot
virus protection.



1-800-538-3373

Call ext. 1313 to qualify for a special trial price,
or to receive a free demo disk. Or call FaxBack® at
1-800-525-3019 and request document #8625.

INTEL. WE PUT YOU IN CONTROL OF YOUR NETWORK.

CIRCLE 882 ON READER SERVICE CARD

intel®

Desktop Videoconferencing

CONTINUED FROM N18

support sound. It is designed as a document-collaboration tool that uses video as a complement. IBM, like AT&T, adds multipoint support so you can videoconference with up to eight people, but you

► FACT FILE

Person to Person for OS/2 and Windows, Version 1.0.3

List price: \$280. **In short:** IBM's Person to Person for OS/2 and Windows is a good solution if you are looking for a multiplatform LAN-based videoconferencing system. It offers low-bandwidth utilization and good document-collaboration support. The product's lack of voice support, however, and the absence of any application-sharing programs can be limiting.

SUITABILITY TO TASK

Video	FAIR
Whiteboard/application sharing	GOOD
Installation	GOOD

IBM Corp., 11400 Burnet Rd., Mailstop 2995, Austin, TX 78758; 800-342-6672; fax, 512-823-1864

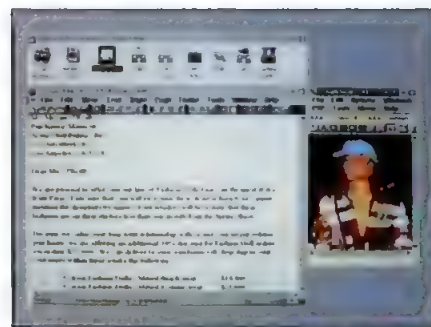
364 on reader service card

can only see one at a time.

The core of the Person to Person system is its videoconferencing software. It's the only product in our roundup that supports IBM's OS/2 and Microsoft Windows. It also includes whiteboard software and features a multiplatform design that supports both Windows 3.1 and OS/2 2.1. For compression and decompression, however, the product supports only Intel's expensive ActionMedia II card (\$1,500).

Person to Person suffers from a slow fps rate—7 to 10, depending on network bandwidth. In our testing we were able to view only about 7 to 8 fps. IBM does provide an extensive set of video controls that let you manipulate the image for the best possible resolution. While video quality was crisp on the OS/2 side, the Windows client's video was poor. Moreover, the lack of sound can prove to be limiting.

What Person to Person lacks in sound and video speed, it makes up for in whiteboarding. While it does not yet support application sharing, the product does



GET PERSONAL: Person to Person has whiteboard software for collaboration.

offer powerful whiteboard software that allows you to edit and annotate any bitmapped image. Person to Person uses DDE (Dynamic Data Exchange) instead of OLE to let you share data between applications. Users can cut and paste formatted text across the LAN, quickly and easily via the Clipboard.

Person-to-Person's straightforward installation software was intuitive and led us through the process with few problems. We did encounter a minor interrupt con-

SURE, MICROSOFT DEVELOPED NT...



flict with the ActionMedia II card but we were able to resolve the problem quickly. The card uses two interrupts—which could cause conflicts with other cards in the PC.

Overall, Person to Person is quite usable, but the lack of sound and application-sharing support make it an unattractive solution.

Intel Corp.

• Intel ProShare Personal Conferencing Video System 200

Intel's already good videoconferencing solution has gotten even better with the addition of application sharing. The Intel ProShare Personal Conferencing Video System 200, bundled with Intel ProShare Personal Conferencing Software, Version 1.6, is an ISDN videoconferencing solution that combines an approachable interface with good video.

The product is limited, however, by its software-based codec that can only run

effectively on high-end PCs. In fact, Intel recommends at least a 486/33 machine. In our test-bed, we used a 486/33 PC as recommended, but we saw poor-quality video with a maximum resolution of only 160 by 120 pixels. Once we installed ProShare on a high-end Pentium/90 machine, we noticed significantly better quality and performance. In fact, the resolution was much improved—to 320 by 240 pixels. If you want high-quality video, we do not recommend installing this product on anything less powerful than a Pentium machine.

The addition of application sharing to the already impressive whiteboard software makes the ProShare an attractive product for document collaboration. To share an application, you simply launch it and click on the share window. This is much easier than AT&T's solution, which requires you to add the application manually to the menu.

Installation of the ProShare was a breeze, aided by its intuitive manual and installation routine. The package came

► FACT FILE

Intel ProShare Personal Conferencing Video System 200

List price: \$2,449 **In short:** This Intel product is an all-in-one videoconferencing solution that supports application sharing and whiteboard software. It is also one of the easiest of these products to install and configure. But because of its software-based compression and decompression it requires a high-end PC, which can be expensive.

Intel Corp., 5200 N.

East Elam Young

Pkwy., Hillsboro, OR

97124, 800-538-3373; fax, 503-629-7580

965 on reader service card

SUITABILITY TO TASK

Video **GOOD**

Whiteboard/application sharing **GOOD**

Installation **EXCELLENT**

equipped with a camera, video-capture board, ISDN adapter, and a combined earphone and microphone. We were able to install the board and configure the software in less than 15 minutes. Intel also provides an excellent diagnostic and troubleshooting tool that checks all compo-

Continues on page NE14

BUT IT'S THE ORACLE7 WORKGROUP SERVER THAT MAKES IT PERFORM.



NOW IT'S EASY TO DO REALLY HARD STUFF ON NT, THANKS TO THE POWER OF ORACLE7. Pretuned and preconfigured for results

right out of the box, Oracle7 Workgroup Server™ allows 2 to 25-person NT workgroups to exploit the SQL database that

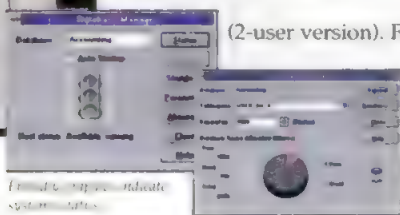
"...outperforms the others by a wide margin."

(PC Magazine). 100% compatible with all leading

Windows® applications and tools, Oracle7 Workgroup Server provides a totally unique combination of graphical administration tools, highly advanced database capabilities, infinite scalability and attractive affordability. Prices start at \$995

(2-user version). For a free informational video call 1-800-633-0518 ext 4441.

**CALL FOR
A FREE VIDEO**



Simple
checkboxes
& pick
lists make
administration
easy.

ORACLE

Desktop Videoconferencing

CONTINUED FROM NE13



SHARING: ProShare uses whiteboard and application-sharing software to communicate.

nents of your videoconferencing system, even the ISDN line. After installation, all we needed to do was enter the ISDN numbers in the ProShare control panel and make our first call.

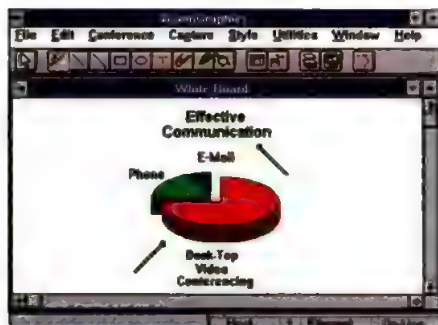
Intel improves on its product with the addition of application sharing. That, along with easy-to-install software and hardware, makes this an excellent choice for your videoconferencing needs.

InVision Systems Corp.

InVision

InVision Systems Corp. improves on an already solid product with Version 3.0 of InVision, its LAN-based videoconferencing software. The upgrade, which replaces Version 2.1.5, offers better-quality video, enhanced compatibility with video-capture boards, and IPX/SPX support.

The product consists of videoconferencing software and Vision Graphics, the whiteboard software. Though InVision does offer a bundled package, we needed to get the video-capture boards and sound



ENVISION: InVision brings you face-to-face with whiteboard software.

SUMMARY OF FEATURES

Desktop Videoconferencing

PC MAGAZINE
NETWORK EDITION
EDITORS' CHOICE

Products listed in alphabetical order

■ = YES □ = NO

	AT&T Global Information Solutions AT&T Vision Personal Video System 1280	IBM Corp. Person to Person for OS/2 and Windows	Intel Corp. Intel ProShare Personal Conferencing Video System 200	InVision Systems Corp. InVision
List price	\$4,995	\$280	\$2,449	\$385
Price of tested configuration	\$7,105	\$1,775	\$2,449	\$1,570
Hardware				
Computer (standard/tested configuration)	■	□	□	□
Network card (standard/tested configuration)	■	□	■	□
Codec (standard/tested configuration)	■	□	■	□
Sound card (standard/tested configuration)	■	□	■	□
Camera (standard/tested configuration)	■	□	■	□
Compression Features				
Supports Indeo	□	■	■	■
Supports Motion JPEG	□	□	□	■
Supports MPEG/Px64	■	□	□	□
Supports RTV	□	■	□	□
Supports hardware/software compression	■	■	■	■
Supports hardware/software decompression	■	■	■	■
Video-capture boards supported	Proprietary	Action-Media II	Action-Media II	Action-Media II, ATI Video-It!, Mambo
Complies with H.320	■	□	□	□
Supports audio	■	□	□	■
Network Support				
Supports IPX/SPX	□	■	□	■
Supports TCP/IP	□	■	□	■
Supports NetBIOS	□	■	□	■
Supports Ethernet, FDDI, and Token-Ring	□	■	□	■
Supports ISDN	■	■	■	□
Supports leased lines (T1 and Switched 56)	□	■	□	■
Bandwidth supported (LAN only)	None	100Kb-1Mb	None	500Kb-1.1Mb
Video Support				
Maximum frames per second	20	16	15	20
Maximum resolution (dpi)	320 x 240	128 x 128	320 x 240	320 x 240
Color depth supported	16-bit	8-bit	8-bit	8-bit
Simultaneous display of incoming and outgoing video	□	■	■	■
Supports multipoint videoconferencing	■	■	□	□
Captures transmitted images	■	■	■	■
Software Features				
Supports whiteboard application	■	■	■	■
Supports real-time application sharing	■	□	■	□
Supports shared Clipboard	■	■	□	■
Service and Support				
Hardware warranty	3 years	Board, 90 days	Board, 3 years; camera and headset, 1 year	N/A
BBS/Toll-free technical support	■	■	■	■
Technical-support hours (eastern time)	24 hours, 7 days a week	9:00-6:00 M-F	10:00-8:00 M-F	8:00-7:00 M-F

N/A—Not applicable. This product is software only.

cards, since the company sent us only the software.

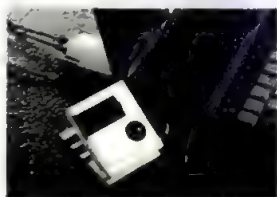
InVision offers good-quality video, with a range of options such as the ability to let users reduce network traffic by adjusting the video quality. Moreover,

Vision Graphics offers powerful annotation tools. But the lack of application-sharing software is a decided weakness.

InVision lets users adjust video quality manually in order to limit bandwidth uti-

Continues on page NE17

GIVE MOBILE USERS THIS WIRELESS LAN SOLUTION AND THEY'LL MAKE THE CONNECTION INSTANTLY.



Photonics COLLABORATIVE is the most reliable and cost-effective in-building wireless network solution available.

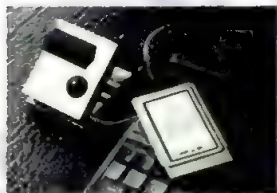
With it, you can effortlessly, transparently, connect on-

campus mobile computer users to network resources, all while they remain untethered. COLLABORATIVE will provide them live, continuously-connected roaming in facilities you designate. So your mobile users can instantly share files, synchronize calendars, use printers and access E-mail, just as if they were cabled directly to your LAN.

COLLABORATIVE also enables users to create their own full-featured, peer-to-peer LANs, usable on-campus or at any remote site. It's just what's needed for ad hoc work groups, for temporary networks anywhere. Perfect for use in conferences, meeting rooms, shared offices, classrooms and portable training areas.

COLLABORATIVE is ideal for granting guest access to your network for consultants, visiting staffers and other intermittent users, too,

without the problems of disrupting your LAN. And you can use it to create or extend networks where hard-wiring would be difficult, costly, or impossible.



Photonics' technology uses diffuse infrared light that bounces off walls, ceilings, furniture and floors. The signal is virtually impossible to block within a room, making the



network connection very reliable. The connection is also very secure—it won't penetrate walls—unless you specifically bridge it to your wiring.

COLLABORATIVE is incredibly power-efficient, for true portability. Setup can be done in minutes. It works with all major networking software. It's a world-ready solution, free from FCC and other governmental restrictions, globally.

And Collaborative is backed by a three year warranty and a 30-day money back guarantee.

Call today, toll-free, 1-800-628-3033*, or fax us at

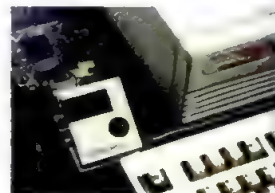
408-955-7950. Get your free copy of the

"Overview of Wireless LAN Technology" white paper and detailed product specifications. Mention this

(actual size)

ad and get a special savings offer on Starter Kits!

Get Photonics. It's the wireless LAN solution to getting your mobile computer users connected, instantly.



PHOTONICS
Instant Wireless Networking

CALL 1-800-628-3033* NOW FOR YOUR SPECIAL STARTER KIT OFFER.

*Outside continental United States, call 408-955-7930, ext. 240

Distributed by: USA—Ingram Micro, UK—Gomark Ltd., ITALY—Ecom and Delta SRL, FRANCE—TCL, GERMANY—HSD GmbH, SWITZERLAND—Wireless Trading AG, AUSTRALIA—I World Systems Pty Ltd., JAPAN—NTT-IT

©1994 Photonics Corporation. 2940 North First Street, San Jose, CA 95134. COLLABORATIVE and the Photonics logo are trademarks of Photonics Corporation. Other brand and product names are trademarks of their respective holders.

CIRCLE 916 ON READER SERVICE CARD

Workstation security. The need has never been greater. The desktops of your enterprise are laden with critical information that can only be described as extremely sensitive. And in all too many cases, wide open to just about anyone.

Unfortunately, up until now, installing security on individual workstations has been an extremely expensive and time-consuming task.

The Gartner Group estimates the

user settings to enforce compliance of your own internal corporate security procedures and policies.

Once DiskLock is distributed, our DiskLock Administrator generates an audit log in a central database so you can view, chart and print a record of every single desktop accessed, when it was



Peter Norton delivers the only workstation security that won't send your administration costs skyrocketing.

proof, it also gives your users the flexibility they need to comply with your security procedures while still being able to get on with their work.

THE NORTON NETWORK SERIES.

DiskLock Administrator for PCs is a Norton Network Series product.

THERE IS NO FASTER, MORE EFFECTIVE WAY TO SECURE YOUR WORKSTATIONS.

cost at \$60 a desktop. In a company of just 1200 PCs, that's a bill of \$72,000.

At Symantec, we realize that your network is the backbone of your corporate information infrastructure. Consequently, every network node must be made secure.

NEW DISKLOCK ADMINISTRATOR.

Our new Norton DiskLock Administrator™ is the

fastest and most cost-effective way to secure all of your PCs and Macintoshes. Bar none.

Available in versions for both platforms, it lets you deliver and configure DiskLock™ security on every PC or Macintosh on your network from one central console on your workstation.

So you can quickly distribute DiskLock to either individuals or work groups and then configure

accessed and whom it was accessed by. It's like having a guard dog.

NEW NORTON DISKLOCK.

Norton DiskLock loads before DOS or the Macintosh O/S. So it can't be circumvented by a set of system start-up disks.

DiskLock provides you with virtually unbreachable security with three different levels of workstation protection.

New DiskLock Administrator is available for both PCs and Macs so you can deliver complete workstation security to every desktop in your company without ever leaving your desk.

File locking to conceal and protect confidential files. And two levels of data encryption to scramble sensitive information: DES, the United States Government Encryption Standard, for highly sensitive files and our own lighter and faster Symantec Proprietary Encryption algorithm.

While DiskLock is virtually tamper

Which means DiskLock Administrator will fully integrate with our Norton Administrator for Networks™ and our many other Norton Network Series enterprise products.

Today, all Norton Network Series products share a common console. Tomorrow, they will share data between their applications.

Together, these products will help you manage all of your end-user resources more effectively.

So you can focus on building the most reliable, responsive, information-rich network possible.

Call for our White Paper on workstation security issues today.

And lock up security on every single workstation you've got.

CALL 1-800-453-1135.

Ask for Ext. 9145 and request our White Paper: Addressing Today's Access To The Enterprise Network.

White Paper available in U.S. only. For more information in Canada, call 1-800-667-8661.



SYMANTEC.
MANAGING THE ENTERPRISE.

Desktop Videoconferencing

CONTINUED FROM NE14

lization. During a standard video session, we found that when InVision runs at its maximum of 20 fps, it consumes 1.2 Mbps (or 12 percent of the theoretical maximum of 10-Mbps Ethernet). We were able to decrease utilization to about 700 Kbps (or 7 percent) by controlling the video quality and frame rate.

Sound quality is relatively poor. We

► FACT FILE

InVision, Version 3.0

List price: \$595 **In short:** If you are in the market for a LAN-based videoconferencing system, then InVision should be your choice. The product offers good-quality video, along with solid document-sharing capabilities. Its low bandwidth

requirements make

it an attractive solution for your LAN

InVision Systems Corp., 8500

Leesburg Pike, #300,

Vienna, VA 22182, 703-506-0094; fax, 703-506-0098

966 on reader service card

SUITABILITY TO TASK

Video **GOOD**

Whiteboard/application sharing **FAIR**

Installation **GOOD**

suggest you turn off the sound support and use a standard telephone for your audio.

Vision Graphics offers many of the standard functions found in the other products in our roundup. During testing, however, we found that the product is compliant only with OLE 2.0 applications. This is a drawback if you are using an OLE 1.0-compliant application such as Microsoft Word for Windows 2.0, since you won't be able to take full advantage of the whiteboard software.

Installation was complicated. Because InVision sent us only its software, we had to provide Howard Enterprises' cameras, a Video-It! video-capture board from ATI Technologies, a Creative Labs Sound Blaster Pro sound card, and an ATI Mach32 video card.

With its multiprotocol support and extensive support for video-capture boards, InVision is your best bet when it comes to LAN-based videoconferencing. It is, however, limited by its lack of application-sharing software. □

O. RYAN TABIBIAN is a technical analyst for *PC Magazine* Network Edition.

► WIRELESS NETWORKING

Netwave: Affordable and Portable

BY STEVE RIGNEY

There are plenty of wireless LAN adapters on the market, but few are as inexpensive and compact as Xircom's new Netwave CreditCard Adapter. This PCMCIA wireless Ethernet adapter is not the fastest we've seen, but it is affordable, well designed, and easy to install.

The Netwave adapter (\$599) is a Type II PCMCIA card that provides spread-spectrum wireless Ethernet connectivity to most notebook PCs and personal digital assistants (PDAs) that are constantly on the move or in difficult-to-wire locations. It works with PCMCIA Card and Socket Services 2.01 and 2.1, or with Xircom's own PCMCIA drivers. Like Proxim's more expensive RangeLAN2/PCMCIA (\$695), the Netwave adapter uses a spread-spectrum, frequency-hopping radio that operates in the 2.4-GHz to 2.483-GHz range. Compared with the RangeLAN2, which has a maximum throughput of 1.6 megabits per second (Mbps) and a 300-foot range between nodes, the Netwave adapter offers both a lower throughput (1 Mbps maximum) and a shorter range (150 to 180 feet between nodes). The difference is due primarily to the RangeLAN2's larger, external antenna, which is more powerful than the Netwave adapter's tiny, built-in antenna but often less convenient for mobile users.

There are two types of spread-spectrum radio: frequency hopping and direct sequence. Frequency-hopping radios, as in the Netwave adapter and the RangeLAN2, broadcast over a range of frequencies, constantly jumping from one to another. This makes frequency-hopping radios almost completely secure against eavesdropping (anyone attempting to listen in will pick up only small bits of a transmission). On the other hand, direct-sequence radios, such as AT&T Global Information Solutions' WaveLAN, use

the entire range of frequencies simultaneously. Direct sequence can provide somewhat higher total throughput, but it is also more susceptible to eavesdropping.

To connect Netwave clients to wired LANs, Xircom provides the Netwave Access Point (\$1,499) wireless bridge. The Access Point has 10BaseT and 10Base2 Ethernet connectors as well as a Type II PCMCIA slot for its own Netwave adapter. You can use Access Points anywhere on your network to provide wireless access and extend the total range of your Netwave network. The Access Points' ranges overlap so that you can wander around a building and, so long as you're in range of one Access Point, not lose your network con-



WIRELESS WAY STATION: Access Points extend the range of Netwave networks.

nection. Because of the limited bandwidth, however, you will not want to connect more than ten cordless users to one Access Point.

UP AND RUNNING

It took us only about 5 minutes to install and configure each of two Netwave adapters into Toshiba T1950 notebook systems. We tested with Microsoft Windows for Workgroups (WfWG) 3.11 and NetWare 3.12, but because Netwave adapters include drivers for both NDIS and ODI you can use them with most other major network operating systems, including LANtastic, Microsoft NT Advanced Server, and OS/2 LAN Server.

We first configured our two notebooks

Continues on page NE18

Xircom

CONTINUED FROM NE17

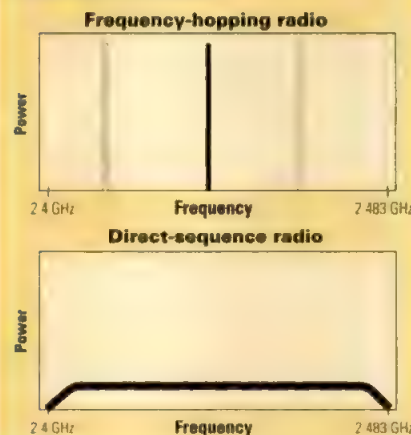
as a two-node WfWG network and transferred files and e-mail between them. The connection worked perfectly. We also connected our two-node wireless workgroup to our wired NetWare 3.12 LAN using an Access Point. The connection was reliable until we moved to a different floor. To boost the signal up to our second floor, we installed a second Access Point. This allowed us to take advantage of the roaming feature, which lets you wander from one Access Point's range to another without losing your network connection.

While we did not evaluate the Netwave adapter's performance with our NetBench tests, we found the overall throughput more than adequate for simple file transfers and e-mail. In fact, it performed roughly twice as fast as our Xircom Pocket Ethernet Modem, which is limited by the parallel port's speed—roughly 300 Kbps.

The Netwave CreditCard Adapter won't set any performance records, but it has all the tools to be a big hit in the wireless market: compact design, low cost, and easy installation.

What's the Frequency?

Frequency-hopping signals continually change from one frequency to another, making them more secure against eavesdropping. Direct-sequence radio signals utilize the entire frequency range, which allows them to support slightly higher throughput.



► **Netwave CreditCard Adapter.** List price: \$599. **Netwave Access Point.** \$1,499 (includes one adapter). Xircom Inc., 26025 Mureau Rd., Calabasas, CA 91302; 818-878-7600; fax, 818-878-7630.

Circle 962 on reader service card

► VINES UTILITIES

StreetMeter Watches over VINES

BY ROB SPARRE

How do you keep your software licenses secure? If you're a VINES user, the answer is NetPro Computing's new StreetMeter, Version 3.0. This easy-to-install, easy-to-use application-metering utility monitors and enforces your software licenses and provides powerful reporting features as well as protection against unauthorized software copying.

StreetMeter, formerly sold as Sentinel Meter, by Trellis Software, comprises server software, which runs on a VINES server, and client software, which includes three separate utilities: StreetMeter, AppTracker, and Meter. StreetMeter transparently monitors access to pointer files (which it creates) and intercepts any

attempts to use metered applications or suites by DOS and Windows clients. Each attempt is validated against the application's license before a user is granted access. New in this release are support for Windows clients and the graphing and reporting tools that let you document your network's software usage.

StreetMeter maintains a database of all metered applications and logs information about their usage, including who used what and for how long. Using StreetMeter's reporting tools, you can turn out reports and graphs of the data. We found this very useful for trend analysis.

As with most metering tools, StreetMeter places all app requests into a queue, and provides access to all users on a first-come, first-served basis. When all licenses are accounted for, you can reserve an application. You are then noti-

fied when the application becomes available. The reservation is nullified, however, after a prespecified time limit (set by the network administrator). StreetMeter also provides a *soft limit* feature, which grants access to users even when no more licenses are available but also notifies the administrator that more licenses are needed.

Installation was a snap for both service and client software. Each server that stores a metered application requires a StreetMeter service (a VINES service is similar to a NetWare NLM). Memory and disk requirements are modest: only 200K to 300K of server memory to run the service and 500K of disk space. An additional 1MB of disk space is required for the StreetMeter database.

To complete installation, we loaded the three client utilities. StreetMeter on the client is the interface to the database. AppTracker is the administrative tool that generates reports and graphs, and Meter is the tool that creates *stub files*, which are pointers that launch the metered applications. These stubs are given the original name of the metered app (EXCEL.EXE, for example) and the app's executable is renamed. This protects against unauthorized copying, since anyone copying the file will only get a pointer file.

The Meter utility is also used for upgrades: Metered applications with stub files must first be unmetered with this utility before the upgrade can be loaded.

According to the vendor, the product requires VINES 5.52(5) on the clients and the server, but we were able to access metered applications from VINES 4.11(5) clients so long as the apps were located on a 5.52(5) server.

StreetMeter is very good at what it does: It stands guard over your licenses and keeps you (and your users) informed about their usage. Throw in the new reporting features and Windows client support and StreetMeter is sure to find a place in any VINES network.

► **StreetMeter, Version 3.0.** List price: \$1,195 per service. NetPro Computing Inc., 7975 N. Hayden Rd., Scottsdale, AZ 85258; 800-998-5090; e-mail, info@net-pro.com.

Circle 960 on reader service card

Go mobile.

Take your network

on the road with

NetWare Connect.



Being mobile once meant being disconnected from all your computing resources. With NetWare Connect,[™] mobile means complete access to your network.

NetWare Connect allows you to take your whole network on the road. From any laptop, you can access E-mail, groupware applications, file, print and other network services. All this using standard off-the-shelf communications products.

As a user, you'll love the seamless connectivity. As a network manager, you'll appreciate how easy it is to consolidate inbound and outbound communications on a single platform. Your network will

be more manageable and secure with NetWare Connect.

With all these features, it's no wonder that NetWare Connect is supported by the industry's leading software and hardware vendors. Act now, and you'll get a 30 day free trial and up to

\$750 in rebates on Cheyenne's FAXserve[™] for NetWare[®] when you purchase NetWare Connect before October 31, 1994.

Before you take to the road again, call 1-800-BUY NOVL or your local reseller to learn more about NetWare Connect. And discover a seamless way to increase productivity on the road.



 **NOVELL**

The Past, Present, and Future of Network Computing.

CIRCLE 890 ON READER SERVICE CARD

► NETWORK ADMINISTRATION

WinInstall Simplifies Software Setup

BY TONY POMPILI AND LENNY GENDUSO

Installing software these days can be downright frustrating. WinInstall, Version 4.0, from On-Demand Software and Services, can simplify the task. This new software distribution tool not only installs most software packages over the network more easily and faster than the packages' native routines, it also provides the unique abilities to record and play back install routines, track changes to each client's startup files and OLE registrations, and send software updates via e-mail.

The problem with most software install routines is that they hurl a myriad of configuration options at users. You can get around this by writing custom net-

work installers, but you'll first need the proper tools, something like Visual Basic or WinBatch. These can be expensive and using them can be time-consuming.

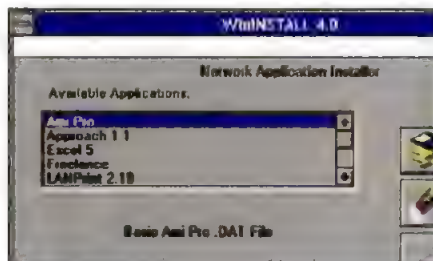
WinInstall (\$495 per server, unlimited users) addresses both of these concerns and allows administrators to define and implement default application installs for the entire network. The product comprises three separate utilities: Administrator, Discover, and Installer. Discover, new in release 4.0, records in an ASCII .DAT file the steps utilized by an application's native install routine. WinInstall then implements

these steps, skipping any unnecessary tasks, such as file decompression (since all necessary files are already decompressed on network volumes) and client custom-install option menus.

The other two components carry over from the previous release but are no less important. Installer is the workhorse: As its name implies, this utility actually installs software applications on the clients.

Installer uses the information gathered by Discover and can be run automatically at startup or launched manually. We found the latter option, which gives users a list of the available applications to choose from, the most practical for daily use. The last component, Administrator, provides a number of configuration options for WinInstall. All of

Continues on page NE24



CLICK AND LOAD: WinInstall lets users install software with the click of a button.

CHAMELEON 4.0

TCP/IP Applications for Windows

Includes WinSock TCP/IP

100% DLL

Only 6KB Base Memory

5 Minute Install

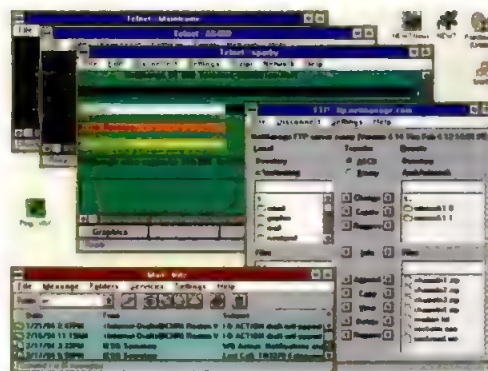
**Internet Communications:
Office, Home,
Remote**

24 WINDOWS APPLICATIONS, MORE THAN ANY OTHER TCP/IP PACKAGE.

APPLICATIONS Telnet (VT100, VT220, TVI), TN3270, TN5250, FTP (client & server), NFS (client & server), SMTP Mail with MIME, NewsReader, PROFS Mail, LPR/LPD, Gopher, Phonetag, Ping, Finger, BIND, Whols, Scripting, Statistics, Custom, TFTP, SNMP Agent, and more.

TERMINAL EMULATION Advanced features include scalable fonts, scripting, button pad, screen capture, drag-and-drop keyboard remapping and printing. **INTERNET ACCESS** Easy point-and-click access to the resources of the Internet.

Read and post to news groups, download software or documents and search gopher space. **NFS** First ever client and server for Windows provides transparent file and printer sharing (ask for Chameleon/NFS). **MAIL** Internet SMTP Mail with folders, rules and MIME multi-media attachments. **DEVELOPER TOOLS** Windows Sockets API; ONC RPC/XDR; WinSNMP, FTP, SMTP APIs, Visual Basic support and more.



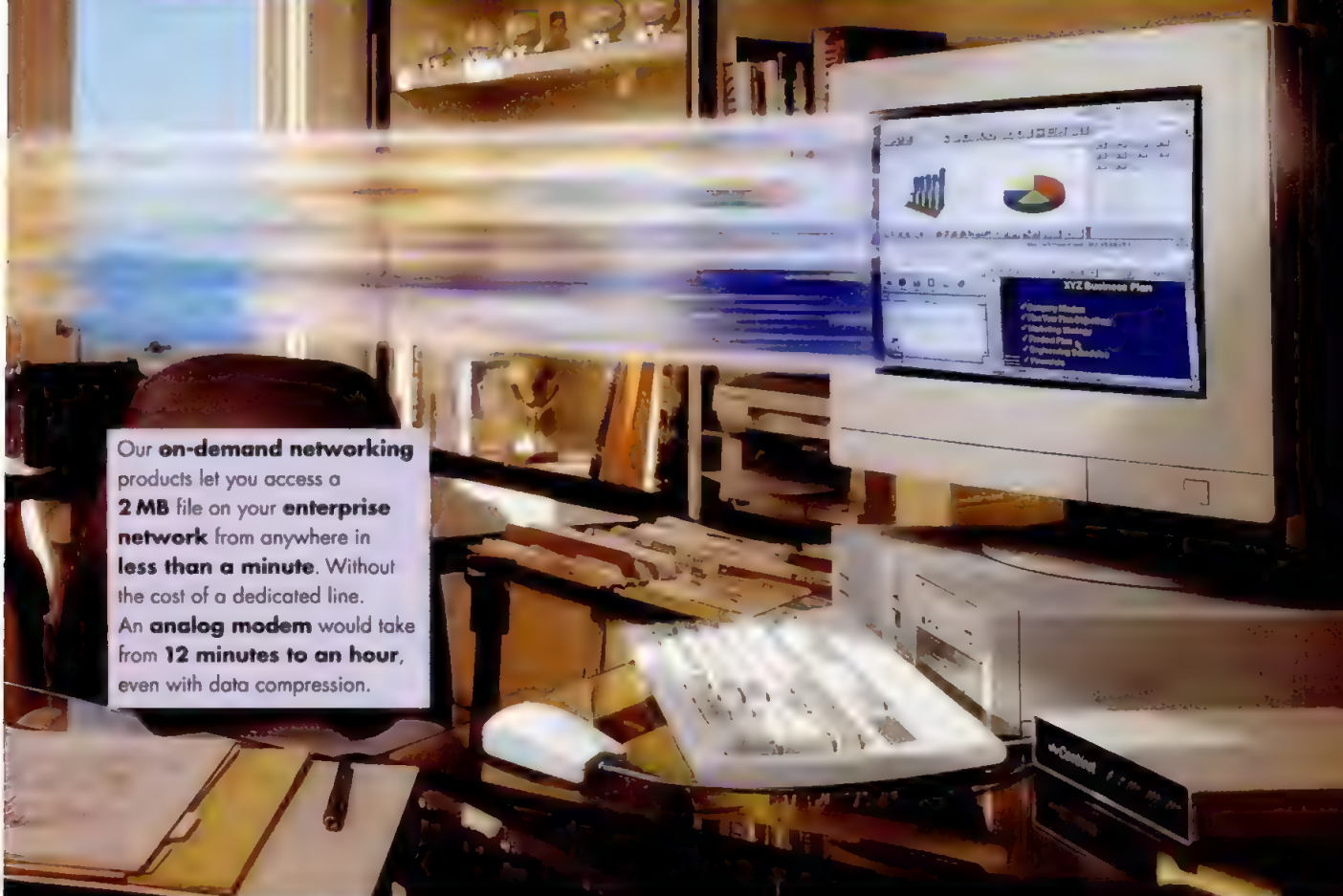
NETMANAGE™
(408) 973-7171
10725 North De Anza Boulevard
Cupertino, California 95014, U.S.A.
Fax: (408) 257-6405



May 1993

CIRCLE 677 ON READER SERVICE CARD

THE FASTEST WAY TO GET WHAT YOU WANT.



Our **on-demand networking** products let you access a **2 MB** file on your **enterprise network** from anywhere in **less than a minute**. Without the cost of a dedicated line. An **analog modem** would take from **12 minutes to an hour**, even with data compression.

If you've tried to access a corporate network from a remote office or from home, you know that operating complex applications via modem is like trying to run the 100-yard dash through waist-deep mud. Only Combinet's Everywhere Networking™ lets you access any file or application on your enterprise network through the telephone network without paying a heavy price in time or dollars. You can easily access information-intensive applications like Windows™ and imaging from any location, just as if your PC, Mac®, Unix® workstation, or X-terminal was hard-wired to the enterprise network. No complex log-in procedures.

No time-consuming waits for large file transfers. Our "Guide To On-Demand Networking"

explains all the benefits of Everywhere Networking and our low-cost, easy-installation on-demand network solutions.

Call today for your free copy.



1-800-967-6651

CIRCLE 872 ON READER SERVICE CARD



EVERYWHERE NETWORKING. The Fastest Way To Get What You Want.

© 1994, Combinet, Inc. Combinet and Everywhere Networking are trademarks of Combinet, Inc. All other trademarks are property of their respective owners. Combinet, Inc. 333 W El Camino Real, Sunnyvale, CA 94087

SEE US AT NETWORK & INTEROP ATLANTA BOOTH #4566

OnDemand

CONTINUED FROM NE22

these utilities run from the network, rather than from a client's local drives.

WinInstall itself loads quickly. Once we had it running, we tried installing Microsoft Access both with and without WinInstall's help. Using Access's built-in installer over the network, it took just over two minutes to install the application. With WinInstall, the same process took less than 15 seconds.

Why is it so fast? Much of the speed can be attributed to the fact that WinInstall doesn't go through all the extra steps that native routines must. But WinInstall does more than just copy files. In fact, it checks the client's hard disk for any .DLL files required by the app and copies over the latest versions of those files. WinInstall also records all changes made to the client's .INI files as well as the CONFIG.SYS and AUTOEXEC.BAT files, so that previous versions of these files can be restored when an application is uninstalled. WinInstall also has a

unique feature that records any OLE connections made in the Windows registry during software installations.

Definitely the handiest of WinInstall's features is the ability to send an e-mail attachment to launch a software installation. This feature works over any VIM or MAPI mail system by sending a .DAT file as an attachment. When the attachment's icon is clicked, Installer is launched and uses the .DAT file to install a new application. We found this feature incredibly useful—especially for distributing an application to an entire mailing list. The feature's only problem is that you first have to add a few lines to each recipient's WIN.INI file—a bit of a nuisance, especially if you have hundreds of clients.

One other problem with WinInstall is its inability to check memory for other running programs. For example, VSHARE .386 is a popular Windows virtual device driver. Although WinInstall can verify that VSHARE.386 is on the system, it can't tell if the driver is actually loaded in memory; this driver may be required to run the

application WinInstall just installed. There is a way around this problem, however: Have WinInstall reboot the clients after installations to ensure that programs such as VSHARE.386 load properly.

Overall, WinInstall is a real lifesaver for software installations on the LAN, and it can definitely simplify the lives of administrators and end users alike. □

► FACT FILE

WinInstall, Version 4.0

List price: \$495 per server. **In short:** WinInstall is an excellent tool for speeding up network software installations and making them less confusing to users. It provides some unique features, such as the ability to send software installations via VIM or MAPI e-mail attachments, and the ability to track changes to a user's OLE registration and startup files. It can't check for the presence of programs in memory on the clients, and you'll have to configure each client's WIN.INI manually to use the e-mail feature, but overall WinInstall is a tool every network administrator should have.

OnDemand Software and Services Inc., 1100 Fifth Ave South, #208, Naples, FL 33940, 800-368-5207, 813-261-6678; fax, 813-261-6549

\$61 on reader service card

KING AMONG PEERS

POWERLan 3.0: The Most POWERful Peer-to-Peer LAN Operating System

Click a mouse four times and key in your name. That's all it takes to install POWERLan. But the sleek, animated interface is just the beginning.

Grows with You

Comfortably add users while you mix and match Windows and DOS. As you grow, enjoy true peer-to-peer and client/server flexibility in any combination.

Strongest Peer Platform

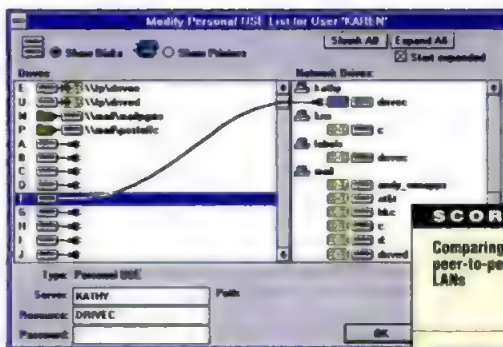
POWERLan's multi-tasking, dedicated server provides the capacity and horsepower for your performance-critical applications.

Designed to Standards

Built to Microsoft/IBM standards, POWERLan speaks the same protocols as networks such as WFW, NT, and IBM LAN Server—complementing these environments where needed.

Incredibly Easy to Manage

Superior user and group handling, single-logout to the entire network, remote admin, and mainframe-style printing—all contribute to POWERLan's easy setup and administration for small or large sites.



Now connecting resources is plug and play—literally!



April 26, 1994
POWERLan 3.0
April 16, 1992
POWERLan 2.20
June 25, 1991
POWERLan 2.10

"POWERLan's combination of ease of use, solid performance, and strong management features will appeal to many small to medium-sized sites looking to connect their stand-alone computers."

PC Week
February 7, 1994

SCOREBOARD				
Comparing peer-to-peer LANs	PCWEEK LABS REVIEW	Artisoft Inc Simply LANtastic 5.1	Microsoft Corp Windows for Workgroups 3.11	Novell Inc NetWare 3.11
PCWEEK LABS Overall score		3.2	3.5	3.5
				4.0



1993
BITE
AWARD
TOP WINNER

800-443-LANS

Performance Technology
800 Lincoln Center
7800 IH-10 West
San Antonio, Texas 78230

PERFORMANCE TECHNOLOGY

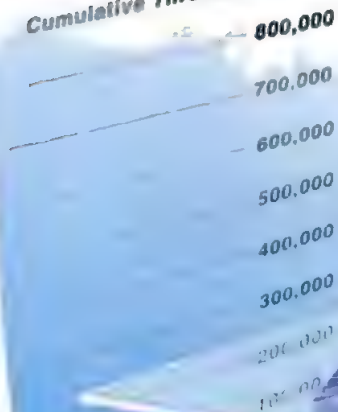
CIRCLE 867 ON READER SERVICE CARD



**Microcom delivers
highest end-to-end
performance in remote
LAN access testing**

In a test of Windows file transfer speeds with eight simultaneous users, LANexpress performed up to 10 times faster than all other products tested.

Cumulative Throughput (bps)



All tests conducted by
The Tolly Group, formerly
InterLAB, the industry's premier
source for authoritative, independent
testing.

New Available
Version 2.0

- ✓ quick, easy installation
- ✓ increased productivity
- ✓ connection via Windows NT

MICROCOM'S LANexpress BREAKS THE BARRIERS TO HIGH-SPEED REMOTE LAN ACCESS PERFORMANCE.

The numbers tell the story. In a strenuous battery of over 100 tests by The Tolly Group, Microcom's LANexpress™ delivered up to 10 times the performance of the other remote LAN access products tested.

Under the load of eight simultaneous remote PC users, LANexpress sustained file transfer speeds—in Windows—of over 100 Kbps per port, for an aggregate throughput of over 800 Kbps. (The closest competitor's

"Microcom's LANexpress exhibited significant performance benefits over the other products tested... (and was) the only device that did not exhibit significant operational problems."

—The Tolly Group

"...faster than any other dial-up remote access device PC Week Labs has tested"

—PC Week

Remote LAN Access
Multi-user
Performance
Benchmarks

Free Performance Report

To help you evaluate remote LAN access solutions, we'll send you a complimentary copy of The Tolly Group Report with facts and figures on all the products tested. Just call the toll-free number

data back to your office LAN at the same time. A 1 MB file that took you two minutes to send via LANexpress would take from 12 minutes to *over half an hour* using the other products tested.

The Tolly Group also found that under the stress of these real-world operating loads, LANexpress was the only one that remained stable throughout testing.

To network managers faced with growing demands for remote access to corporate LANs, the report's message is clear: LANexpress is the only remote access solution designed for high end-to-end multi-user performance. It figures.

For a free copy of The Tolly Group Report and the name of your Microcom reseller, phone
1-800-822-8224

microcom®

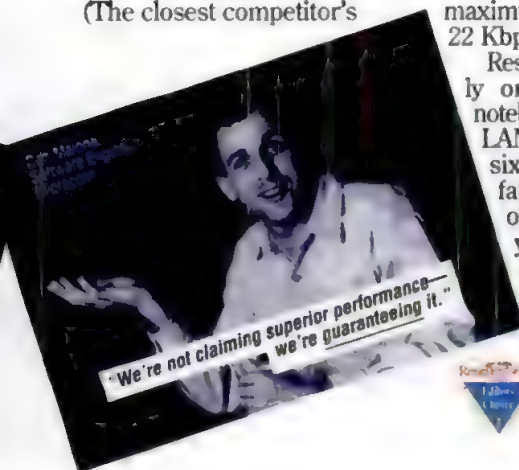
The brightest ideas in remote access.

Microcom, Inc., USA (617) 551-1000 • Microcom U.K. Limited, (44) 483-740763
Microcom E.M.A., France (33) 1 46 62 68 68 • Microcom Singapore, (65) 295-2061
Microcom Australia, (61) 2 410-9953

Microcom is a registered trademark and LANexpress is a trademark of Microcom Systems, Inc.

All other trademarks are the property of their respective trademark holders.

*Developer Tested Only: Novell makes no warranties with respect to this product.



We've changed ur name but not t ur spots.

Allied Telesyn International. A new company? Hardly. You'll recognize us as Allied Telesis, or simply ATI. Or, you know us as an industry leader in Ethernet connectivity. Whichever name you know us by, one thing's for sure; We will continue to bring you a broad range of high quality, reliable networking products. All at a cost that has gained us thousands of customers and friends around the world.

Allied Telesyn helps you create a solid networking foundation with products ranging from transceivers and repeaters, to a full line of intelligent, stackable, hot swappable hubs, and low cost, high quality NIC cards. The products you need for today's networks. And you can count on us for products and technologies to meet tomorrow's needs.

A new name, for the same solid company that network managers around the world depend on for quality, reliability, and value. Call us today. We'll introduce you to Allied Telesyn, a new name for an old friend. 1-800-424-4284.



575 Middlefield Road, Mountain View, CA 94043
Telephone 415-964-2771, FAX 415-964-8250.

CIRCLE 905 ON READER SERVICE CARD

Formerly
Allied Telesis

► WORKGROUP SOFTWARE

The Low-Cost Ace of Groupware

BY TONY POMPILI

LAN Aces' new Office Logic for Windows, Version 1.37, is a versatile groupware package with a host of features, including e-mail, group scheduling, and real-time chat—all for about as much as some vendors charge for scheduling applications alone. Office Logic does not come with Windows documentation and does not support VIM or MAPI e-mail systems, but the product is impressive nonetheless.

You can run Office Logic for Windows (\$495 for ten users) either from a shared network drive or on a client's local PC. In either case, the e-mail and scheduling databases are stored on the server. The product works with NetWare LANs and any network that uses NetBIOS, such as LANTastic.

Although the term groupware typically brings Lotus Notes to mind, we found that Office Logic really has very little in common with Notes other than e-mail. Rather, Office Logic rivals products like WordPerfect Office, Version 4.1 (\$495 for ten users plus \$295 per server). Not only does Office Logic provide e-mail and scheduling features comparable to those in WordPerfect Office, but it costs less and offers several additional features.

We installed a ten-user license of Office Logic on a NetWare 3.12 network, loading all the files into a shared drive. The process was simple, thanks to a NetWare-specific install routine that read user names from the NetWare Bindery and made it easy to set up accounts for each user (a similar routine is also included for LANTastic).

We found the interface fairly intuitive. This is especially important inasmuch as the documentation describes only the DOS version. We were able to send and receive mail from our Windows client without a hitch. Since the mail engine is

MHS-compliant, Office Logic does not support special text formatting or multiple fonts. However, MHS compliance does allow Office Logic to access other MHS services, such as MCI Mail.

The group scheduler is impressive and gives dedicated scheduling packages a run for their money. Setting up meetings was simple, and Office Logic even sends out a mail message to each person planning to attend.

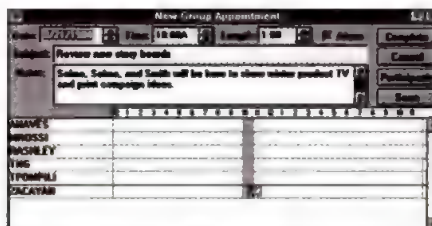
We also liked the chat feature, which allowed us to carry on real-time conversations with other users. Additional features

include a utility much like Caliente International's While You Were Out (discussed in Network Edition, First Looks, September 13, 1994), which lets you take phone messages and send them to another user's mailbox. A to-do list, notepad, phone book, and shared .DBF-format database are also included.

Office Logic for Windows is a strong product in most respects. It offers a multitude of groupware tools for a low price. Our complaints—the DOS-only documentation and lack of VIM and MAPI support—are minor when compared with the product's overall feature set.

► Office Logic for

Windows, Version 1.37. List price: 10 users, \$495; 25 users, \$1,995; 100 users, \$4,995; LAN Aces Inc., 12777 Jones Rd., #481, Houston, TX 77070; 800-526-2237. Circle 967 on reader service card



MEETING TIME: Group scheduling is just one of several features in Office Logic for Windows.



YOUR WINDOW TO THE WORLD

With Datapoint MINX™ Network Video Systems

Imagine the power of connecting all your PC's into a global video network. It sounds pricey and a real technical challenge, right? Not so, with the MINX family of networked video systems (NVS).

Up to 786 PCs can be networked locally. Dial direct from your desktop PC to one or more desktops without operator intervention or assistance.

The MINX NVS solution offers affordable multipoint, multisite, local and wide area videoconferencing where it's needed most — at your desktop.

Give us a call and get started today!

1-800-DPT-MINX

CIRCLE 932 ON READER SERVICE CARD

D DATAPOINT

**ALL THE FRIENDLINESS
OF LANtastic®**



**ALL THE HORSEPOWER
OF NetWare®**



ALL IN ONE SOLUTION

Introducing CorStream™ server

Say you're building bigger databases and running more sophisticated applications. These days, who isn't? And now you need a powerful, yet friendly, dedicated server network operating system. Prepare to be pleasantly blown away by CorStream server from Artisoft.

CorStream puts the awesome performance of a fully featured

NetWare 4.01 Runtime operating system behind the friendly disposition of LANtastic. Zoom! It's peer/server perfection.

And as an introductory offer, we'll give you a free high-speed Eagle Technology 32-bit adapter card with your purchase.

For information on how to power up a serious network that's fun to use, call 1-800-809-1248 for your Artisoft Premier™ or Artisoft Advantage™ Partner.

ARTISOFT CorStream—Real Peer/Server Stuff

**Special Introductory
Offer! Free Eagle
32-Bit Ethernet Card!**

© 1994 ARTISOFT, INC. All rights reserved. Artisoft and LANtastic are registered trademarks, and CorStream is a trademark, and Artisoft Advantage and Artisoft Premier are service marks of Artisoft, Inc. Eagle Technology is a business unit of Artisoft, Inc. NetWare is a registered trademark of Novell, Inc. TABASCO® is a registered trademark of McIlhenny Co., Avery Island, LA 70515

CIRCLE 918 ON READER SERVICE CARD

**The IBM Server 95
with RAID-5**

**"The IBM PS/2
Server 95 Array
belongs on every
system manager's
short list."**

*Julian Evans
PC Magazine
UK Edition
December '93*



IBM PS/2 Server 95 Array
December '93

Full RAID-5 protection at RAID-0 performance levels – an impressive combination. This is a primary reason Mr. Evans urges "short listing" the IBM PS/2® Server 95 Array. An urging, we might add, that is based on extensive tests and expert comparisons against the competition.

What paying heed to Mr. Evans means is the opportunity to choose IBM reliability in a full-performance, fault-tolerant server package. "A natural choice," as PC Magazine puts it, "for hosting mission-critical networked database applications." And indeed, their server choice for Editors' Choice.

In choosing the IBM PS/2 Server 95 for your application, more IBM benefits are at your service. Not the least of which includes a 30-day, money-back, quibble-free guarantee, a 3-year, same day, on-site warranty* and around-the-clock, 7-days-a-week IBM service and support. Anywhere in the USA.

For more information, call our 24-hour Personal Systems HelpCenter® at 1-800-772-2227** or to receive a FAX, dial 1-800-IBM-4FAX and ask for documents 2375 and 2376.

Pick your power—
Intel® Pentium™ 66MHz and 60MHz,
Intel 486DX2 66MHz processors

Migration made easy—
protect your investment with
total processor upgradability

Break bottlenecks— with zero-wait SyncroStream™
data-piping technology

Super speed—a 256KB cache
SCSI-2 Fast/Wide disk controllers

C2 security— IBM LogicLock™ locks in data, locks
out unauthorized entry

IBM

*Copies of IBM's statement of limited warranty are available upon request by calling 800-772-2227.

**In Canada, call 800-465-7909. IBM and PS/2 are registered trademarks and SyncroStream is a trademark of the International Business Machines Corporation. Intel is a registered trademark and Pentium is a trademark of the Intel Corporation. PC Magazine UK is a trademark of Ziff-Davis Communications. ©1993 IBM Corporation

► GROUP SCHEDULING

OnTime: Only a Matter of Time

BY JEFFREY D. BAHER

Campbell Services' OnTime Enterprise for Novell NetWare, Version 1.12, is the first enterprise-wide group-scheduling application that tracks updates and changes in real time. This feature, combined with the product's friendly interface and support for both personal and group calendars, makes OnTime accurate, easy to use, and versatile. However, the real-time updates may not be valuable enough to make up for some of the product's weak points, such as resource scheduling and remote-user support.

OnTime provides both personal and group scheduling for NetWare users in LAN/WAN environments. Because it updates calendars in real time, it runs continuously as an NLM on the server. The client software is an executable that resides on a network volume. Of course, real time does not always mean instantaneous: OnTime is still subject to the speed and reliability of the network.

Each OnTime server on the network maintains its own calendar database for local users. However, users can browse and make changes to any OnTime calendar to which they have access. Updates and changes to remote servers' calendars are sent across the network as soon as they are made. In this way, OnTime calendars are always current as long as net-

work links don't fail.

Typically, group schedulers use a store-and-forward system to update calendars, particularly across WAN links where bandwidth is such a precious commodity. Take, for example, Microsystems Software's CaLAnDar (Version 2.10m was an Editors' Choice, *PC Magazine*, February 9, 1993). Each CaLAnDar server on the network maintains a copy of every calendar. Changes to a calendar are stored on the local server, and the entire CaLAnDar system

is updated via e-mail (VIM, MAPI, or MHS) at regular intervals. Just as OnTime depends on healthy network links, CaLAnDar is completely reliant on the e-mail system: If a gateway at one office goes down, the calendars at that site will fall behind the rest of the network.

COMING UP A LITTLE SHORT

Installation of OnTime was a snap. All we had to do was load the NLM on our server and copy the client executable files to a shared network drive. To complete the process, we simply made sure that each of our clients had NetWare rights to the client files.

OnTime's personal and group-scheduling features are relatively strong and easy to use. The process for editing personal and group calendars is the same. By double-clicking on a particular date, time, or the "add" button, we opened the scheduling window. From this window, we were able to select events from a list of categories, including appointments and meetings as well as to-do items. To invite other users to a meeting, we simply clicked on the "select attendees" button. Unlike CaLAnDar, OnTime does not support user groups, so in order to invite all your salespeople to a meeting, you have to select each name individually—a

rather tedious process if you have a large group to invite.

By setting up full read/write OnTime access on each client, we were able to browse and edit other clients' personal calendars from our PC. To prevent this type of meddling, however, we set up all our clients with read-only access to other clients' personal calendars.

OnTime can also track schedules for resources, such as conference rooms and slide machines. However, OnTime treats resources as users—and the application is sold on a per-user basis. This means

that you need to account for every resource you'll want to schedule when you purchase an OnTime license. In contrast, CaLAnDar treats users and resources as separate cate-

gories, and every license of CaLAnDar supports up to 200 resources. Although resource scheduling may not be a key concern in an enterprise scheduler, it is just another area where OnTime comes up short.

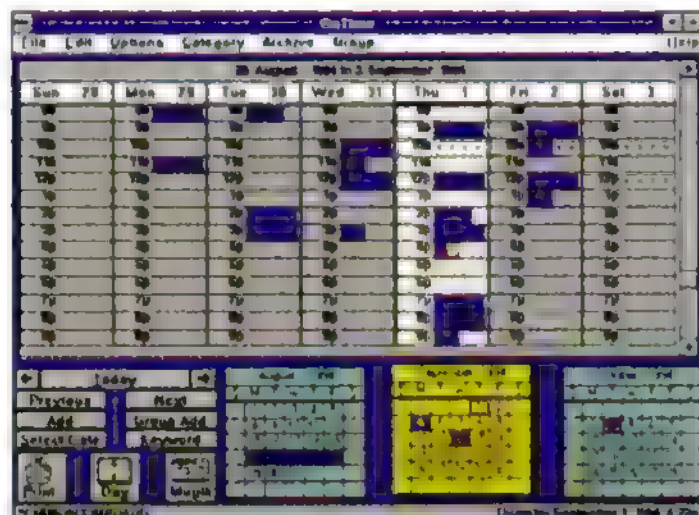
For remote access, OnTime can be accessed with any remote-control software. However, the product has no reconciliation feature, which synchronizes all changes made to a user's calendar while he or she is away from the office. Without reconciliation, you're likely to get stuck with two separate calendars that look very little alike. CaLAnDar offers this feature currently, while Campbell Services plans to include it in the next release of OnTime.

OnTime Enterprise for Novell NetWare is a good group-scheduling application, it just may not be the best. It really depends on your priorities: If real-time schedule updates are crucial to you, OnTime is the only product that can currently meet your needs.

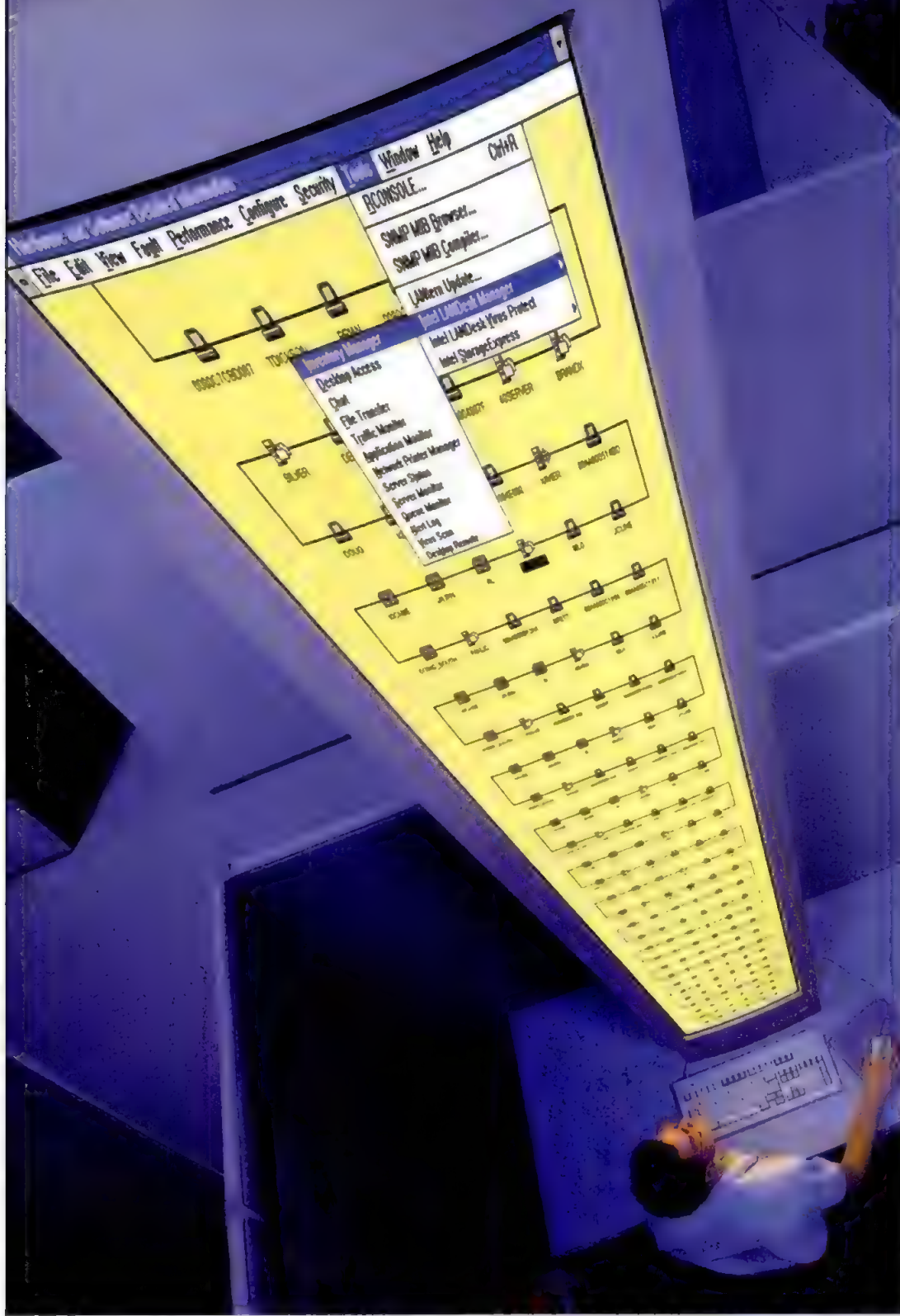
► **OnTime Enterprise for Novell NetWare, Version 1.12.** List price: 100 users, \$56 per user; for 5,000 users, \$40 per user. Campbell Services Inc., 2100 Northwestern Hwy., #1070, Southfield, MI 48075; 810-559-5955; fax, 810-559-1034. Circle 968 on reader service card



CHECK IN: OnTime Enterprise keeps track of responses to your meeting requests.



AT A GLANCE: OnTime Enterprise's interface lets you quickly check and edit your schedule.



©1994 Intel Corporation. Third party names and trademarks are property of their respective owners.



LANDESK MANAGER SOFTWARE

*lets you control and manage
network servers, services
and desktop PCs right
from your desk.*



*It snaps into enterprise
management platforms
such as Novell NMS and
HP OpenView for Windows
to provide a complete
end-to-end manage-
ment solution.*



*Provides a complete set
of LAN management tools
you can tap into: Desktop
Access, Virus Protect,
Print and Inventory
Management.*



1-800-538-3373

*To learn more about Intel's
end-to-end management
solution, call ext. 435
for your free video and
information kit.*

**INTEL. WE PUT YOU
IN CONTROL
OF YOUR NETWORK.**

End-to-end control for
any size network.
That's LANDesk™ Manager.

CIRCLE 928 ON READER SERVICE CARD

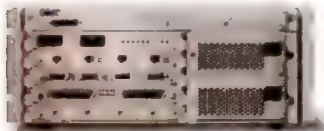
intel®

It's easy, baby.

No matter what your age or experience, you'll find SMC's new EtherEZ™ Ethernet adapter child's play to install. After all,



it works in both Plug and Play (PnP) and non-Plug and Play ISA computers. It's fully compliant with PnP specifications so no configuration is needed. There are no jumpers to set and the I/O mapping feature



EtherSwitch ES/1



Ethernet TigerHub

SMC's complete networking solutions include LAN switches, hubs, LAN adapters and network management software.

requires no PC memory.

What's more, our new version of EZStart™ makes driver installation and adapter management faster and easier than ever.

**For A \$49 EtherEZ
Combo Adapter,
Call 1-800-SMC-4-YOU,
Dept. EZ31.**

The new EtherEZ adapter from SMC. If only everything in life was this easy.

- Requires No Configuration
- SimulTasking™ For Superior Performance
- Extensive Driver Support
- Three Models: 10Base-T, Combo, Thin Coax
- SNMP and DMI Manageable

SMC
SWITCH ON THE POWER

New EtherEZ™ Plug and Play

Offer is limited to one per customer, while supplies last. U.S. dollars. All trademarks and registered trademarks are the property of their respective holders. © 1994 Standard Microsystems Corporation.



News of announced network products and upgrades

By Vicki B. Jacobson

NEW

Banyan Announces New Management Scheme



BRINGING IT TOGETHER:

DeMarc allows users to preserve investments in existing management platforms.

Banyan Systems' new Distributed Enterprise Management Architecture (DeMarc) uses three key standards—Open Database Connectivity (ODBC); SNMP, Version 2; and standard SQL—to collect, store, and distribute network management information.

DeMarc can complement existing management platforms, including IBM's NetView/6000, HP OpenView, or SunSoft's SunNet Manager, while integrating Banyan's StreetTalk global directory services. DeMarc provides network managers with real-time views of all information gathered from the various network clients, applications, and databases. The system can perform such tasks as fault monitoring, collecting and storing historical data, and performing backup and security functions. Network managers can perform management functions from any workstation without the need for dedicated management consoles.

The architecture is based on the SNMP, Version 2, standard so any SNMP-compliant workstation can query the management information. Information can be stored and retrieved using standard ODBC or SQL calls.

► **Distributed Enterprise Management Architecture.** Banyan Systems Inc., 120 Flanders Rd., Westboro, MA 01581; 508-898-1000.

Circle 951 on reader service card

NEW

Communique Dials Up the World

Two new turnkey communications servers from **CommVision Corp.** consolidate multiple remote communications in one box. The Communique systems accommodate concurrent services such as dial-in (remote node and remote control), dial-out, and fax. Both servers support a variety of LAN protocols, including AppleTalk, IP, and IPX, as well as Frame Relay, ISDN, T1, and X.25 for WAN access.

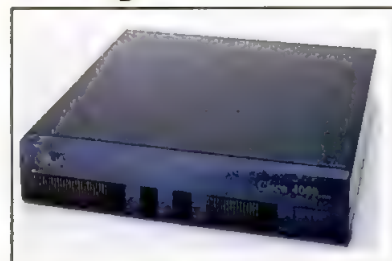
The Communique Connect Server (CS) supports modem pooling and remote-node dial-in from DOS, Macintosh, and Windows computers, as well as dial-out from DOS and Windows computers. The server supports from 4 to 64 lines and comes with Intel's LANSight, NetWare Connect, and NetWare Runtime management software preinstalled. The Communique Remote Control Server (RCS) concentrates on remote-control dial-in. In addition to LANSight and NetWare Runtime, the server is loaded with Ocean Isle Software's ReachOut remote-control software. Communique RCS comes in 4-, 8-, and 16-line versions. The Communique systems are fault-tolerant and feature a packet-switching backplane.

► **Communique Connect Server.** List price: \$6,995. **Communique Remote Control Server.** List price: \$12,995. CommVision Corp., 510 Logue Ave., Mountain View, CA 94043; 415-254-5720; fax, 415-254-9320.

Circle 955 on reader service card

HOT PROSPECT

Cisco Enhances ISDN Offerings



With the number of ISDN users growing, **Cisco Systems** announced a new midrange router, as well as expanded support for several of its existing routers. The enhancements include the addition of an ISDN primary-rate interface (PRI) that delivers speeds of up to 1.544 Mbps to Cisco's high-performance 7000 routers and an ISDN basic-rate interface (BRI) for speeds of up to 144 Kbps to the Cisco 4000/4500 routers. The PRI interface will be available via a software option for the 7000's WAN card, the Multi-channel Interface Processor (MIP).

Cisco will also give users the option of adding four or eight BRI ports to the Cisco 4000/4500 mid-range routers. The Cisco 4500 (\$9,200) is the company's recently announced branch-office router. The 4500 features an increase in performance over the 4000 thanks to the addition of a 100-MHz, 64-bit RISC processor.

► **ISDN support for Cisco routers.** List price: For the Cisco 7000, no additional cost; for the Cisco 4000/4500, \$4,800 to \$8,000. Cisco Systems Inc., 170 W. Tasman Dr., San Jose, CA 95134-1796; 415-326-1941.

Circle 954 on reader service card

AFTER ALL THE TIME YOU PUT INTO
YOUR DISTRIBUTED NETWORK,
WOULDN'T YOU HATE TO SEE IT COME
CRASHING DOWN IN AN INSTANT?

Managing mission-critical, distributed networks isn't easy. Because

you never know what's coming your way.

But Distributed Sniffer System* helps you avoid unwelcome surprises. From a central management console, its standards-based remote monitoring (RMON)



DISTRIBUTED SNIFFER SYSTEM

CIRCLE 922 ON READER SERVICE CARD

provides insight into your network's normal operation and alerts you when trouble's brewing on the horizon.

And Expert Analysis automatically pinpoints and identifies the problem source before it engulfs your network.

DSS reduces operating costs, opti-

mizes network performance and integrates with management

systems, making it an essential part of any distributed computing environment.

Call Network General, 1-800-764-3337



dept. GM5508, for your free Network Analysis Solutions kit, and avoid being hit with

wave after wave of problems. ▼

T B O O S N T F F E R

NEW

Tribe Links Remote Users

While CommVision tackles both LANs and WANs, **Tribe Computer Works** announced its entry into remote-LAN networking with its **TribeLink** server. With **TribeLink**, remote PC, Macintosh, and Unix users can access AppleTalk and TCP/IP networks using a standard phone line, for under \$2,000 (and IPX for an additional \$295). The remote-networking server features eight ports (four microprocessors working in a parallel architecture) for speeds of up to 57.6 kilobits per second (Kbps).

The server is based on the Point-to-Protocol (PPP), allowing it to carry multiple protocols, multiple levels of security, dial-in and dial-out services, and LAN-to-LAN routing. Management is provided via Tribe's **LinkTracker**, which allows network administrators to define and manage users, set levels of access, and configure ports for particular modems. SNMP management is also supported.

► **TribeLink**. List price: \$1,995. **Tribe Computer Works**, 960 Atlantic Ave., #101, Alameda, CA 94501; 800-778-7423, 510-814-3900; fax, 510-814-3980.

Circle 959 on reader service card



SERVING THE TRIBE: **TribeLink** gives Mac, PC, and Unix users access to AppleTalk, IPX, and TCP/IP networks.

NEW

Dialogic and Radish Integrate Voice, Fax, and Visual Data

Dialogic Corp. and **Radish Communications Systems** announced an agreement that will add visuals to voice response systems. **Dialogic's VFX/40**, a voice/fax board, will incorporate **Radish's VoiceView** protocol for integrating voice, fax, and visual images in a single application. **VoiceView** is a protocol that lets you send voice and data over the wire simultaneously. The **VFX/40** board features four channels for voice and fax processing. The two products together allow information accessed from a database to be seen as well as heard: Callers can hear voice prompts and view option menus on their PCs.

► **VFX/40**. List price: To be announced. **Dialogic Corp.**, 1515 Route 10, Parsippany, NJ 07054; 201-993-3000.

Circle 956 on reader service card

NEW

Cisco Steps Toward ATM Interoperability

Cisco Systems announced that its new ATM switch, the **HyperSwitch A100**, will offer support for Phase 0 P-NNI (Private Network Node Interface). Phase 0 P-NNI is a specification for switch-to-switch signaling and routing between products from different switch vendors in a single environment.

The switch, codeveloped with **NEC Corp.**, allows users to customize their ATM switching choices, both in cost and speed: **HyperSwitch** supports up to 16 155-megabit-per-second (Mbps) ATM interfaces. The **HyperSwitch 100** also supports the **Transparent Asynchronous Transmitter/Receiver Interface (TAXI) 4B/5B** ATM specification for 100-Mbps transmissions and the **Synchronous Optical Network/ Synchronous Digital Hierarchy (SONET/SDH) STS3c/STM1** ATM specification for transmission speeds up to 155-Mbps.□

► **HyperSwitch A100**. List price: \$21,900; **SONET 155-Mbps interface card**, \$1,250; **TAXI 100-Mbps interface card**, \$1,050. **Cisco Systems Inc.**, 170 W. Tasman Dr., San Jose, CA 95134-1796; 415-326-1941; fax, 415-326-1989.

Circle 953 on reader service card

BRIEFS

BRIDGES

Olicom announced a new multiport bridge to link branch offices to a central site with a Token-Ring environment. The **Remote Multiport Bridge** (\$6,500) supports connections for up to four E1/T1 WAN remote bridges with speeds from 9.6 kilobits per second (Kbps) to 2.048 megabits per second (Mbps). 214-423-7560.

Advanced Computer Communications (ACC) upgraded its line of bridge/routers—**Amazon**, **Nile**, and **Tahoe**—to include support for flash memory. With flash memory, network managers can download and store new configuration information and router software using either the **Trivial File Transfer Protocol** or **ZMODEM**. 408-366-9600.

HUBS

LanNet Data Communication's new modules for its **MultiNet** hubs integrate SNA and Token-Ring networks. Included in the new line of modules is the **Integrated Token Ring Extension (ITRE)** bridge (\$1,995) that connects up to 80 remote lobes to a central site. **ITRE** supports a variety of protocols, including SNA, IP, and IPX. 714-752-6638.

Madge Networks strengthens its line of Token-Ring products with the addition of the **Madge Smart 16/4 MC Hubcard**. The **Hubcard** (\$895), or hub-on-a-card, is designed for **Micro Channel-based NetWare** servers. Each **Hubcard** provides support for up to 10 Token-Ring stations using UTP or STP cabling. **SNMP** management is supported, as well as **Novell's NetWare Management System (NMS) 2.0** and **Hub Management Interface**. 800-876-2343.

Hot Wax and Jet Sprays Have Their Place. But Not In Quality Color Printing.



Introducing the world's only true 600x600 dpi desktop color laser printer.

The QMS® *magicolor* Laser Printer gives you output resolution that's twice that of enhanced color inkjet and thermal wax transfer. Fast and networkable, the QMS *magicolor*™ Laser Printer also offers extremely low consumable usage and cost unmatched by any other printer in its price range, with new features for even less money. Here's your chance to polish your image. For more information on how the QMS *magicolor* Laser Printer can make your work shine or the ColorSpecialist nearest you,

Call 800 972-6708 Dept. 4020.



QMS

For service on QMS and other products, call
800 762-8894 (U.S.) • Q-Fax 800 633-7213
E-mail: info@qms.com • Canada 800 263-5508
CIRCLE 884 ON READER SERVICE CARD

QMS Reference Price: QMS ColorScript Laser 1000 \$7,999 • QMS *magicolor* Laser Printer 12 MB \$9,999 • QMS *magicolor* Laser Printer 28 MB \$10,999
QMS, the QMS logo and *magicolor* are trademarks or registered trademarks of QMS, Inc. One Magnum Pass, Mobile, AL 36618, 205 633-4300

A Compressing Situation

Software-only video compression can bring affordable video to your LAN.

By Don Labriola

Videoconferencing over LANs could soon become a commodity, rather than a luxury. PictureTel Corp.'s new LiveLAN/V videoconferencing system and Duck Corp.'s new TrueMotion S video-compression algorithm will not only make LAN-based videoconferencing possible without expensive video-processing boards, but it will also provide excellent video quality.

To date, videoconferencing over the LAN has been expensive and bandwidth-greedy. However, a software-based video-compression algorithm can eliminate the need for a costly video-capture board and minimize bandwidth consumption by using highly compressed video.

There are two types of video compression algorithms: symmetric and asymmetric. Symmetric algorithms, which are the best for real-time videoconferencing, employ the same series of steps to compress and decompress a video signal, so both processes take the same amount of time. Asymmetric algorithms, such as TrueMotion S, do the heavy work during compression and simply leave instructions for decompression. This means that compression takes longer, but decompression is extremely fast. These algorithms are usually employed in hardware

codecs, which can add several hundred dollars to the cost of a video-capture board.

LIVELAN/V

PictureTel (800-716-6000) will soon unveil a software-only, point-to-point videoconferencing product that works over Ethernet LANs. LiveLAN/V will deliver high-quality video over the LAN to small windows (160 by 120 pixels) on relatively high-end client PCs (66-MHz 486s or better).

The keys to LiveLAN/V are its powerful software codec and its ability to manage bandwidth consumption on the LAN. The LiveLAN/V codec is asymmetric, but only slightly so. It takes only a short while longer to compress video than to decompress it. Without management, videoconferencing can quickly overwhelm a network and cause serious degradations in performance and video quality. LiveLAN/V addresses the issue by dynamically scaling the bandwidth

consumption of a session.

For enterprise-wide bandwidth management of multiple LiveLAN/V sessions, PictureTel's LiveManager utility can limit the number of sessions on each network segment.

Of course, software-only is a relative term: You still need a camera, a microphone, a sound board, speakers, and a video-capture board. The difference is that the capture board won't require a built-in hardware codec and will cost around \$500 less.

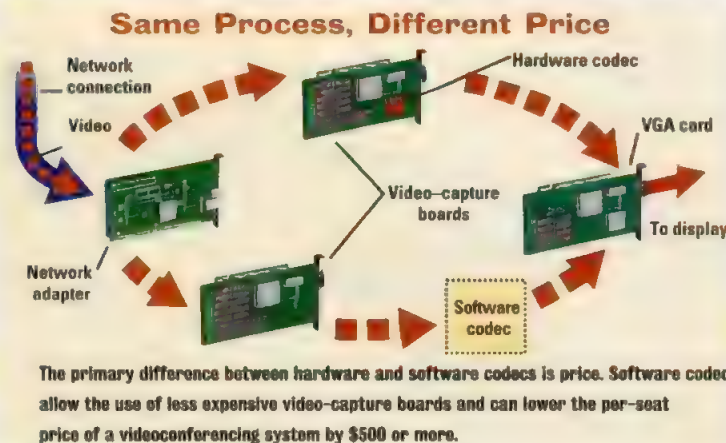
TRUEMOTION S

Unlike LiveLAN, Duck's TrueMotion S software codec is not quite ready for prime time on LANs. It should, however, find its way into third-party videoconferencing systems during 1995.

Currently, TrueMotion S provides exceptional quality for one-way video playback: 640-by-480 resolution with 65,000 colors and at rates of 30 frames per second (fps) on a 66-MHz Pentium-based PC and 20 fps on a 66-MHz 486 PC. TrueMotion S compresses each frame individually, ignoring similarities between them. Typically, an algorithm looks for similarities between frames and compresses them in groups. Despite this unprecedented software-only performance, TrueMotion S is not well-suited

for Ethernet LANs, because it is a highly asymmetric algorithm.

Duck claims that the TrueMotion S technology could be easily modified to handle real-time network applications. The determining factor for Duck is market demand, which should continue to grow—especially as the promise of cheaper and more powerful videoconferencing systems looms on the horizon. □



**With our new
PCI-to-Fast SCSI
model, this is
considered standard
equipment.**

When your data is driving at speeds like this, make sure your I/O is safely keeping pace. That's why you'll want the new Adaptec® AHA®-2940 family of host adapters.



Under the hood is a souped-up version of our PhaseEngine® RISC processor, allowing the AHA-2940 to maximize system I/O performance and utilize the PCI local-bus to

transfer data up to 133 MB/second. But, how valuable is speed if you're on a crash course? The AHA-2940 passes every safety check. It's 100% PCI 2.0-compliant today and is tested with all major PCI hardware and peripherals as soon as they're released. And, like all Adaptec IOWare® products, the AHA-2940 and the PCI SCSI Master® kit offer Adaptec's superior compatibility, quality and reliability.*



When you're driving in the fast lane, make sure you have the safety equipment you need. Call 1-800-934-2766 and ask for details on the PCI SCSI Master kit or the new AHA-2940 family of PCI host adapters. For safety and performance, we're setting a whole new standard.

adaptec®

I/O. NOW MORE IMPORTANT THAN EVER.

Is Notes Headed for the Obit Page?

David, I have very mixed feelings about Lotus Notes. Up until now it has been the only practical product that can do some pretty nifty things, but every day I hope that some package will come along to knock it off its perch, before we revert to the bad old days of centralized data automation. Now, I think I see something that will make the Notes vulture jump.

I respect the work behind Notes, but in fact too much work is required behind the scenes in Notes to make it a truly successful system. The interlocking group of managers, consultants, and Notes geeks behind any good Notes deployment is too much like glass-house mainframe computing for me. They have their own arcane language, their own secrets, and their own unquestioned lead times for making any changes to the system. And that doesn't even begin to explore how Notes will stress-test your network.

Digital Communications Associates (DCA) has come up with a way to clip the wings of the high-flying Notes community. Until now I've referred to DCA as the company that would have been better off putting its substantial cash into home-mortgage loans rather than into more high-tech investments. But the new management team has rolled out a potentially winning product called Open Mind. Open Mind doesn't do everything Notes does, but it does some important things better.

Unlike Notes, Open Mind aims more at research and discussion than at databases. It is affordable on-line document management—like having your own Lexus for little guys. The Open Mind server indexes all posted text and provides powerful searching engines for users. You can post corporate documents, newsletters, messages, and reports and search them in many different ways. Then you can create a function called a Monitor that informs you when any related document or search item is added to or changed. The software does a great job on threaded discussions. The only real drawback in the first release is the lack of off-line replication for remote callers.

Open Mind is much easier to administer than the Notes database of databases, and I think that many organizations considering Lotus Notes will find that DCA's Open Mind does what they want more easily.



Frank Derfler:
The affordable solution offered by Open Mind is like having a Lexus for little guys.

Did you really say that Open Mind is an alternative to Notes? Spare us the hype, Frank. Open Mind might be a nifty package, but it's simply another niche product: It fills one need, but it isn't the groupware solution. It's time we drop the obit page and start looking at the real news.

Notes is groupware. When we tested 89 groupware products for our Changing Office issue (June 14, 1994), what product did we review in the most categories? Notes, of course. Whether you want a database, a workflow package, an e-mail system, or even a group-discussion package, Notes has something for you. Now with the release of Notes Express, users get even more for their money. Express is expected to be a low-cost, entry-level client that will let users read and write to databases but not develop them.

It's a mistake, Frank, to see Notes simply as any one of these components. Its strength is that it offers a complete development environment that provides these functions and more in one package. Can you run your order-entry system against Open Mind? I don't think so. Will you get workflow with Open Mind? Not today.

What about something more mundane such as e-mail? You might think Open Mind is easier to install and administer, but did you take into account that you'll still need to buy a mail

system, a database server, and a workflow package?

Besides, while you spew the DCA hype about Open Mind being easier to administer than Notes, I would reserve judgment until there are enterprise Open Mind networks. Notes has already been field-tested in large networks.

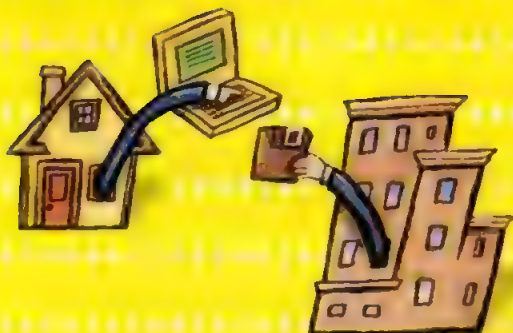
And you breeze by replication as if it were a minor concern. Open Mind has no replication. Frank, you spend weeks each year on the road. You know that without a mobile client you'd be forcing our readers to remain tethered to the LAN. Until DCA gives me a mobile client, I can't imagine how today's professional can take the package seriously.

What DCA and every would-be Notes-obit writer needs is a "GroupWare Suite." Bundle and integrate the best groupware products, and then maybe you'll have the Notes killer. Until then, these groupware upstarts are going to keep on gambling on niche markets, while customers turn to the one product that answers all of their groupware needs: Lotus Notes. □



David Greenfield:
Spare us the hype. DCA's Open Mind is a nifty niche product, but it's not Lotus Notes.

Run with it.



Introducing the go-anywhere diskette from 3M. Rated number one in reliability and preferred three to one over other brands—and now with enhanced performance features to let you work anywhere. There's simply no other diskette that performs like it. That's why more businesses protect important information on 3M brand data storage products than any other brand in the world. Find out more. Call 1-800-888-1889, ext. 1001.

3M diskettes require compatible drives.
Preference and reliability ratings based on independent research.
©3M 1994

3M *Reliability*

CIRCLE 910 ON READER SERVICE CARD

HARDWARE

Communications Devices.....	NE41
Diagnostic/Management/Test	NE43
Hubs/Routers/Bridges	
Network Interface Cards	
Mass Storage/Network Backup	
Power Supplies/UPS	
Printers/Print Devices	NE43
Systems/Servers	NE42

SOFTWARE

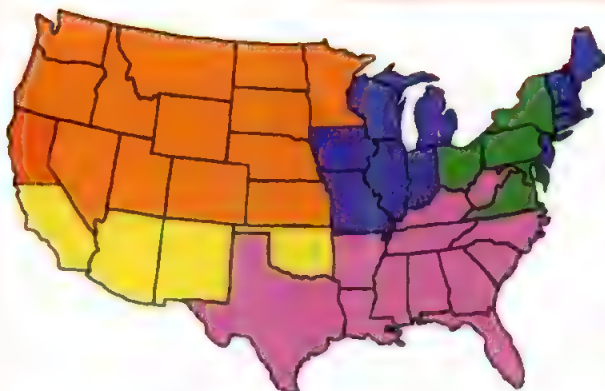
Diagnostic/Management/Test	
Networked Applications	NE43

SERVICES

Consultants/Systems Development.....	
Network Data Backup/Recovery	
Vars/Systems Integrators	

MISCELLANEOUS

Cables/Wiring/Connectors.....	
-------------------------------	--



SALES MANAGER Monte Wasch (212) 503-5182

ACCOUNT MANAGER Leslie Eddy (212) 503-5171

SR. ACCOUNT REP. Bill Herbst (212) 503-5193

ACCOUNT REP. Elisabeth Drumm (212) 503-5118

ACCOUNT REP. Carolyn Goldfarb (212) 503-5076

territory also includes Alaska & Hawaii

ACCOUNT REP. Maggie Hewit (212) 503-5156

ACCOUNT REP. (212) 503-5115

territory also includes Canada & foreign

COMPLETE SYSTEM CONTROL



THE APEX DESKTOP CONCENTRATOR

Compact, highly functional unit allows complete control of each system with single keyboard, mouse and monitor. Maintains connection with each system, assuring complete, reliable system restart after power failures or commanded reboot. Four- and eight-channel versions available.

Call For More Information:
206-861-5858

FROM ONE KEYBOARD

Video, Keyboard, Mouse Concentration

Automatic System Restart

Keyboard System Selection

Connect Up To 64 Systems

Internal Power Supply

IBM compatible & Macintosh



APEX
PC SOLUTIONS

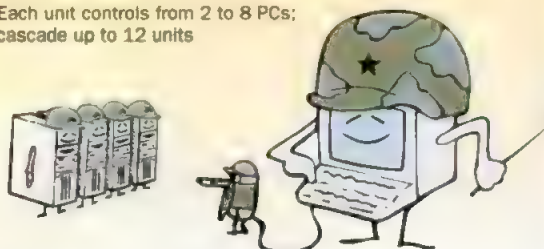
4580 150th Avenue NE, Redmond, WA 98052 FAX: 206-861-5757

CIRCLE 820 ON READER SERVICE CARD

AutoBoot Commander™

Control up to 96 file servers with just 1 keyboard, monitor and mouse!

- Supports all 100% IBM compatible computers
- New KeyScan™ feature for keyboard-controlled scanning
- Jumperless support for analog (VGA) and TTL video
- Add a second control center up to 150 feet away
- AutoBoot™ feature boots computers without operator intervention
- Each unit controls from 2 to 8 PCs; cascade up to 12 units



For Macintosh support,
ask about our new
Mediator™ for Macintosh!

Cybex Corporation
4912 Research Drive • Huntsville, AL 35895 USA
(205) 430-4000 • FAX (205) 430-4030



IBM is a trademark of IBM Corporation. Macintosh is a trademark of Apple Computer, Inc.
Dealer Program Available Made in USA

CIRCLE 821 ON READER SERVICE CARD

LANPro XPRESS SERVER

THE RELIABLE REDUNDANT SERVER

- Supports i486 DX2 66MHz, Pentium 60/66/90MHz
- Supports Dual Pentium Processors
- Multiple Architecture EISA/VLB or EISA/PCI
- Performance up to 180 mips
- ECC Memory
- 16Mb to 384Mb of memory
- Redundant SCSI Array featuring online "Hot-Swap" & "Hot-Spare"
- Chassis with direct air flow design
- 12 front accessible drive bays
- RPS with "Hot Swap" & "Hot-Spare"



VALUELINE VLB & PCI

VALUELINE NETWORK READY PCs

- i486 SX25, DX33, DX2/66 MHz processors
- Pentium 60, 66, 90 MHz processors
- 256 KB L2 write back cache
- S3 Video Controller Superior Graphics Performance
- PCI or VESA local bus architecture
- Enhanced IDE or Fast SCSI support
- High speed serial ports
- Bi-directional parallel port
- NE2000 Combo

One year on-site service.



LAN Professionals
Networking
Systems, Inc.
1801 Brentwood Drive
Suite 100
Camden, Texas 75920



800/454-9999 • FAX: 214/458-9836

CIRCLE 824 ON READER SERVICE CARD

mcw AT-Lan-Tec

LAN Connectivity...
...the ONLY...
...with Affordable Quality!

E-Link III 3C509 TP 5pk/20pk	\$95/90ea
E-Link III 3C509 BNC 5pk/20pk	\$95/90ea
E-Link III 3C509 Combo 5pk/20pk	\$99/93ea
EtherExpress 16 Coax/AUI (5pk)	\$110ea
EtherExpress 16 TP RJ45/AUI (5pk)	\$119ea
EtherExpress 32 BNC/AUI (5pk)	\$519ea
Generic Pocket Adapter BNC	\$ 89
Generic NE2000 BNC / TP (5 pk)	\$ 29
Generic NE2000 3 In 1 (5 pk)	\$ 37
Generic HUB 8-port \$125 / 16-p \$295	

AT-Lan-Tec Hardware

NE1000 8-bit BNC or TP	\$ 59
NE2000 2 in 1 Combo	\$ 46
NE2000 3 in 1 Combo	\$ 48
NE2100 3 in 1 Combo	\$ 64
PCI 2 in 1 Ethernet	\$169
Hub 16-Port RJ45	\$399
Hub 32-Port RJ45	\$699
SNM Hub 16-Port RJ45	\$799
Pocket Adapter 2 in 1	\$129

Category 5 UTP Cable	
Pre-Moulded Cable Ends Available in a rainbow of colors	
Category-5 UTP 7feet	\$ 8
Category-5 UTP 10feet	\$ 12
Category-5 UTP 14feet	\$ 15
Category-5 UTP 25feet	\$ 18
Category-5 UTP 50feet	\$ 27
Category-5 UTP 100feet	\$ 39

Pre-Moulded Coaxial Cable	
Coaxial RG58/RG62 10feet	\$ 7
Coaxial RG58/RG62 25feet	\$ 10
Coaxial RG58/RG62 50feet	\$ 13
Coaxial RG58/RG62 100feet	\$ 29

TESTER for CABLE RG58 & RJ45 \$89	
NOVELL NE2100 BNC&AUI	\$ 39
3.12 5 user	\$ 595
3.12 10 user	\$1369
3.12 25 user	\$1875
3.12 50 user	\$2499
3.12 100 user	\$3390

301-948-7070 BBS 301.990.6998
Settings 14.4, 8, N, 1

CIRCLE 822 ON READER SERVICE CARD

**PC Magazine/
Network Editions**
**300,000 circulation is
nearly twice as high as
that of the largest LAN-
specific publication.**

Shouldn't you be advertising your network product in the publication that reaches the most network product buyers?

Call 800-825-4237 today!

SELL THE BUYERS AT NETWORK-RICH SITES...

PC Magazine/Network Edition subscribers work in companies that have an average of 36 LANs with 1217 nodes installed ... and they specify the brands for a wide array of network products...

**ADVERTISE HERE AND
INCREASE YOUR NETWORK
PRODUCT SALES. CALL YOUR
NETWORK EDITION PREMIER
ACCOUNT REPRESENTATIVE
TODAY AT 800-825-4237**

% of subscribers who specify the brands of...

Modems and Commercial Software	81%
Peripheral Sharing Devices	66%
Application Software for LANs	61%
Network Adapter Cards/Interface Cards	58%
File Servers	58%
Back-Up Devices for Networks	57%
Storage Systems for Networks	47%
Network Management Products	46%

Source: 1993 PC Magazine Networking Subscriber Study

CONTROL ALL YOUR PC SERVERS

FROM ONE KEYBOARD, MONITOR AND MOUSE



**NEW
P Models
shipping**

with **MasterConsole®**

COMPARE QUALITY AND PRICE PERFORMANCE

- Save Space, Cut Costs & Centralize Control With 100% Reliability
- "Plug and Play" Any Mix of ATs & PS/2s, Supports PS/2 & Serial Mouse & All Video
- Desktop or 19" Rack Mount Models for 2, 4, 8, 16 PCs, Expand to 64
- Keyboard & Mouse Emulators for Error Free PC Operation and Autoboot
- AUTOSCAN™ to Monitor All PCs
- Remote Access up to 150 Feet
- Thousands in Use Worldwide GSA Schedule for U.S. Federal Govt.

CALL TODAY!
(908) 874-4072 x44



RARITAN COMPUTER, INC. 10-1 Ilene Court, Belle Mead, NJ 08502 FAX (908) 874-5274

30-DAY MONEY BACK GUARANTEE FULL 1-YEAR WARRANTY

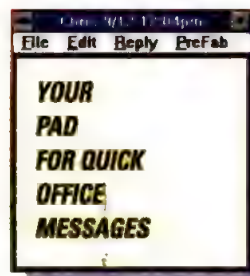
See us at **PC Expo Chicago Booth #903**

Germany - Inmac	Tel: 0211-8558-2	Fax: 0211-8558-133
Japan - Proside Corporation	Tel: 81-3-3254-6131	Fax: 81-3-3254-6134
Taiwan - Raritan Computer Taiwan, Inc.	Tel: 886-2218-1117	Fax: 886-2218-1221
The Netherlands - Artelcom B.V.	Tel: 31-10442-3313	Fax: 31-10442-3443
United Kingdom - Keritron LTD	Tel: 44-244-536123	Fax: 44-244-531043

INTERNATIONAL RESELLERS INQUIRIES WELCOME - CONTACT RCI (908) 874-4072

CIRCLE 825 ON READER SERVICE CARD

ZOOM..... WHAT WAS THAT?



Sending a
QUICKFLASH™ for Windows
note is faster than e-mail.

- Group messaging system
- Instant message transmittal
- No log-in required
- Easy administration
- Text, drawing and screen capture

\$249 for 10 users ■ \$399 for 25 users

**Call (212) 371-4900
to order today!**



477 Madison Avenue, New York, NY 10022
Phone (212) 371-4900 ■ Fax (212) 750-7419

CIRCLE 826 ON READER SERVICE CARD

Typhoon SERIES

TAKING YOUR NETWORK PRINTING BY STORM

Typhoon laser printers are an irresistible force to meet your network or production printing needs.

The Typhoon 30 and Typhoon 60 print simplex or duplex pages at 30 and 60 images per minute, have paper capacities of up to 3,000 and 5,000 sheets, low cost-of-ownership and duty cycles of 200,000 and one million pages per month.

For smaller work groups, the Typhoon 20 produces 20 pages per minute at up to 800 dpi.

All of these printers handle up to 11"x17" paper and offer VPT™ network connection. VPT supports four protocols and over 20 operating systems and allows one printer to act as 64 different virtual printers.



Call Toll Free
800 x 800 dpi
(800-980-0374)



Dataproducts

CIRCLE 823 ON READER SERVICE CARD

DIAGNOSTIC/MANAGEMENT/TEST - PRINTERS/PRINT DEVICES - SOFTWARE/NETWORKED APPLICATIONS

PREMIER



SUBSCRIPTION SALE

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all
from PC MAGAZINE.

To receive your lowest possible rate,
call toll-free:

1-800-289-0429

BONUS:

Free Home or Office Delivery

Please mention code 4294 to our operator.

Network Edition Advertisers Index

Reader Service No.	Advertiser	Page
910	3M Data Storage Products	NE40
934	Adaptec.....	NE38
905	Allied Telesis	NE26
872	Combinet	NE23
932	Datapoint Corporation.....	NE27
*	Digital Equipment Corporation	NE4
*	Farallon Computing	NE2-NE3
*	Hewlett Packard.....	NE9
882	Intel Corporation.....	NE10-NE11
928	Intel Corporation	NE31
855	Micro Solutions Computer Products.....	262
893	Microcom	NE25
877	NetManage, Inc.	NE22
922	Network General	NE34

Reader Service No.	Advertiser	Page
858	NOTIS Systems, Inc.....	336
890	Novell, Inc	NE19-NE21
*	Oracle Corp	NE12-NE13
867	Performance Technology	NE24
916	Photonics.....	NE15
899	QMS	NE7
884	QMS	NE36
909	Standard Microsystems Corporation.....	NE32
851	Symantec Corporation	NE16
920	US Robotics Inc	36

* No Reader Service #. Please Call Advertiser
 For Information.

FOR QUICKER RESPONSE
FAX TO
(609) 829-0807

FREE NETWORK PRODUCT INFORMATION

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 1687
RIVERTON, NJ 08077-9687

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



Welcome... to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Void after February 28, 1995



FREE NETWORK PRODUCT INFORMATION REPLY CARD

820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849
850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879
880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909
910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939
940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969
970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MS dept.?
01. ☐ Yes 02. ☐ No
2. Please indicate your company or organization's primary business activity: (Check one)
01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer-Aerospace
03. ☐ Manufacturer-Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11. ☐ Research and Development
12. ☐ Data Processing/Computer Service
13. ☐ Health/Medical/Legal Service
14. ☐ Engineering/Architecture
3. Please indicate your primary business interest: (Check one)
01. ☐ DP/MS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.
4. Is your company a reseller?
01. ☐ Yes 02. ☐ No
5. For how many nodes do you specify brands of networking products?
01. ☐ 10 or less 03. ☐ 25-99
02. ☐ 11-25 04. ☐ 100 or more
6. Do you plan to buy any network products:
01. ☐ Now 03. ☐ In 7-12 mos.
02. ☐ In 4-6 mos. 04. ☐ No plans
7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location:

01. ☐ LAN to LAN	04. ☐ LAN to LAN
02. ☐ LAN to Host	05. ☐ LAN to Host
03. ☐ LAN to WAN	06. ☐ LAN to WAN
8. Number of employees in your entire company and at the site where you work:

Entire Company	At This Location
01. ☐ 25 or less	01. ☐ 25 or less
02. ☐ 26-99	02. ☐ 26-99
03. ☐ 100-499	03. ☐ 100-499
04. ☐ 500-999	04. ☐ 500-999
05. ☐ 1000 or more	05. ☐ 1000 or more

Name

Title

Telephone

Company Name

Address

City

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$34.97 (U.S. price), all other countries add \$36.00 for additional postage.

PC 10/25-1



Welcome... to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Valid after February 28, 1995



FREE NETWORK PRODUCT INFORMATION REPLY CARD

820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849
 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879
 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909
 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939
 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969
 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MIS dept.?
 01. ☐ Yes
 02. ☐ No
2. Please indicate your company or organization's primary business activity: (Check one)
 01. ☐ Manufacturer Computer Equip., Computers, Software
 02. ☐ Manufacturer-Aerospace
 03. ☐ Manufacturer-Other
 04. ☐ Systems House
 05. ☐ Computer Consultant
 06. ☐ Computer Retailer/VAR/VAD Distributor
 07. ☐ Communications
 08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
 09. ☐ Education
 10. ☐ Government
 12. ☐ Research and Development
 13. ☐ Data Processing/Computer Service
 14. ☐ Health/Medical/Legal Service
 15. ☐ Engineering/Architecture
3. Please indicate your primary business function: (Check one)
 01. ☐ DP/MIS
 02. ☐ Systems, Programming
 03. ☐ Communications
 04. ☐ Engineering
 05. ☐ Res./Dev./Scientific
 06. ☐ Accounting/Finance
 07. ☐ Computer Consulting
 08. ☐ Purchasing
 09. ☐ Operations
 10. ☐ Production
 11. ☐ Education/Training
 12. ☐ Marketing/Sales
 13. ☐ Medical/Legal
 14. ☐ Admin./Mgmt.
4. Is your company a reseller?
 01. ☐ Yes
 02. ☐ No
5. For how many years do you specify brands of networking products?
 01. ☐ 10 or less
 02. ☐ 11-25
 03. ☐ 26-99
 04. ☐ 100 or more
6. Do you plan to buy any network products?
 01. ☐ Now
 02. ☐ in 4-6 mos.
 03. ☐ in 7-12 mos.
 04. ☐ no plans
7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location:

Installed	Planned
01. ☐ LAN to LAN	04. ☐ LAN to LAN
02. ☐ LAN to Host	05. ☐ LAN to Host
03. ☐ LAN to WAN	06. ☐ LAN to WAN
8. Number of employees in your entire company and at the site where you work:

Entire Company	At This Location
01. ☐ 25 or less	01. ☐ 25 or less
02. ☐ 26-99	02. ☐ 26-99
03. ☐ 100-499	03. ☐ 100-499
04. ☐ 500-999	04. ☐ 500-999
05. ☐ 1000 or more	05. ☐ 1000 or more

PC 10/25-1

Name

Title

Telephone

Company Name

Address

City

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$34.97 (U.S. price); all other countries add \$36.00 for additional postage.

FOR QUICKER RESPONSE

FAX TO

(809) 829-0842

**FREE NETWORK
PRODUCT INFORMATION**

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 1687
RIVERTON, NJ 08077-9687

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



User-to-User

BY NEIL J. RUBENKING

The File Manager Doesn't Do DoubleSpace

Microsoft Windows users who use DOS 6.x with DoubleSpace or who use Stacker 3.1 should be aware that the File Manager can no longer make a working bootable system floppy disk. Neither the Make System Disk menu choice nor the Make System Disk check box in the Format Disk dialog will cause the File Manager to copy the new hidden system file DBLSPACE.BIN (required by DOS 6.x to access DoubleSpace drives) to the floppy disk. Using either the SYS or FORMAT /S command at the DOS prompt, however, will do the trick.

This may be a serious problem for disk-compression users who depend on the File Manager to make their emergency system disks. The bottom line: Always test your emergency boot disk before putting it away!

*Rick DeJarnette
Lacey, Washington*

► **PC MAGAZINE:** DOS 6.x's FORMAT /S command transfers the 50K DBLSPACE.BIN to a system floppy disk along with COMMAND.COM, IO.SYS, and MSDOS.SYS. DoubleSpace users accus-

tomed to this behavior can get a nasty surprise if they try to boot from a system floppy disk formatted by the File Manager! Every PC user should have one or more bootable floppy disks stored in a safe place, and every bootable floppy disk should be tested. You may find that you can't access your hard disk without a certain driver; copy that driver to the boot disk and add it to the boot disk's CONFIG.SYS. It's also a good idea to include a tiny file editor like *PC Magazine's* TED.COM on your boot disk in case you need to change the AUTOEXEC.BAT or CONFIG.SYS files.

On the other hand, if you don't use DoubleSpace, you're losing 50K of valuable space on every system disk you create using the FORMAT /S or SYS commands. You can use the commands ATTRIB -R -H -S DBLSPACE.BIN

and DEL DBLSPACE.BIN to remove DBLSPACE.BIN from the disk. For a true DOS 6.x solution, try the command DELTREE /Y DBLSPACE.BIN. The DELTREE command was created to delete whole branches from your directory tree, but it will also delete individual files, disregarding the read-only, hidden, and system attributes.

Undocumented Commands in DOS 6

Here are some useful undocumented commands in DOS 6. Instead of the VER command, use VER /R. You'll get not only the current DOS version but the revision level and the memory area where DOS is loaded. And rather than using the three commands MD TEST, CD TEST, and RD TEST to create, go to, and delete a temporary directory named TEST, try these undocumented commands:

+MD (same as MD D)
+CD (same as CD D)
+RD (same as RD D)

Just use the D subdirectory for your temporary directory.

*Lennart Becker
Berlin, Germany*

► **PC MAGAZINE:** You can use the /R switch with VER in DOS 5.x as well but not in earlier versions. Its output looks like this:

MS-DOS Version 6.00
Revision A
DOS is in HMA

If DOS isn't loaded in the high memory area on your system, the last line will read "DOS is in low memory".

As for the commands +MD, +CD, and +RD, they are actually just three exam-

► IN THIS SECTION

Tutor 291
Corporate Developer 294
Toolkits 299
Environments 301
Utilities 308
Solutions 313

HEADS, IT'S REAL. TAILS, IT'S FAKE.



It's your choice. A little more than 50 percent of all business software in use today is pirated. If you buy it, you could end up with virus-ridden, phony software that has no documentation or product support.

Selling or copying pirated software without authorization is against the law, with severe criminal and civil penalties including imprisonment of up to five years, fines of up to \$250,000, or both. If you suspect the sale or use of pirated software, call the BSA Anti-Piracy hotline:

BSA (800) 888-BSA1 (2721)



© 1993 Business Software Alliance. All rights reserved.

PC TECH User-to-User

ples of a more general phenomenon. In DOS versions starting with 3.0, prefixing an internal DOS command with a plus sign apparently causes DOS to execute the command and treat the last letter of the command as its first command line parameter. Thus, +MKDIR, +CHDIR, and +RMDIR create, switch to, and remove a directory named R. The command +SET=FOO is interpreted as SET T=FOO, +PROMPT as PROMPT T, and +TYPE as TYPE E. Is this a bug in COMMAND.COM, or does it have some esoteric purpose? As yet, we don't know. But *someone* will most likely find a use for it!

ALTPAUSE Update

After trying to use the ALTPAUSE.SYS driver described in the December 8, 1992, column, I believe I've discovered a small bug in it. The problem occurs near the end of the driver just before the registers are being restored, where the driver is apparently attempting to zero the device attribute word and the first byte of the driver logical name. Because the data segment register is still set to 40h, the driver is actually zeroing the port base addresses for COM3 and LPT2 (low byte) in the BIOS data area. The two errant instructions are

```
MOV WORD PTR [0004], 0000
MOV BYTE PTR [000A], 00
```

To work as intended, either these two instructions should have CS segment override prefixes or the DS register should be set to CS prior to their execution.

ALTPMOD.SCR (Figure 1) is a modified version of the script file that includes the necessary segment overrides. By the way, I don't believe it's necessary to zero the first byte of the logical name, but that instruction has been retained.

*L. J. Mistretta
Sunnyvale, California*

► **PC MAGAZINE:** Many thanks! Other readers have pointed out that the original ALTPAUSE.SYS caused problems with COM3 and LPT2. But neither they nor I saw the simple solution explained here. To create the fixed ALTPAUSE.SYS for yourself, use the command `DEBUG < ALT-`

```

A100
DB FF FF FF FF 00 00 16 00 21 00
DB "ALTPAUSE"
DB 00 00 00 00
CS:
MOV     [0012], BX
CS:
MOV     [0014], ES
RETF
PUSH    DS
PUSH    ES
PUSH    AX
PUSH    BX
MOV     AX, 0040
MOV     DS, AX
TEST    BYTE PTR [0017], 0F
JNZ     012A
CS:
MOV     BX, [0012]
CS:
MOV     ES, [0014]
ES:
MOV     WORD PTR [BX+03], 0100
ES:
MOV     WORD PTR [BX+0E], 0000
MOV     [BX+10], CS
CS:
MOV     WORD PTR [0004], 0000
CS:
MOV     BYTE PTR [000A], 00
POP     BX
POP     AX
POP     ES
POP     DS
RETF

RCX
5D
N
W
Q
ALTPAUSE.SYS

```



Figure 1: This DEBUG script produces a version of the ALTPAUSE.SYS utility that fixes a bug found in the original.

`PMOD.SCR > ALTPMOD.LOG`. If you find any "Error" lines in the LOG file, correct the preceding line and try again. You can also download ALTPMOD.SCR from PC MagNet's Utilities/Tips forum as ALTPMO.ZIP.

For those who don't remember the original program, the purpose of ALTPAUSE.SYS is to give you the option of pausing CONFIG.SYS processing. The output of device drivers loaded in CONFIG.SYS can scroll off the screen before you see any error messages displayed. By inserting `DEVICE=ALTPAUSE.SYS` at strategic points in your CONFIG.SYS, you can give yourself the option of temporarily stopping the processing of CONFIG.SYS lines while you read what's on the screen. Just hold down the Alt key when CONFIG.SYS starts, and when the processing reaches ALTPAUSE.SYS, it will wait until you release the Alt key. □

Tutor

BY JEFF PROSISE

How Secure Is Encrypted Data?

July's Tutor column was devoted to the subject of data encryption—the art of scrambling bits and bytes in a file so that it's unusable to anyone who doesn't have the decryption key ("How to Keep It a Secret"). The same issue's Utilities column featured a Windows-hosted encryption program named WinCrypt, which I put together as a tool for password-protecting sensitive data files ("WinCrypt Protects Your Data").

In the weeks following WinCrypt's publication, several readers took me to task for implying that WinCrypt's encryption was more secure than it really was. They even suggested methods for decrypting WinCrypt files without the password. Ensuing discussions on CompuServe provided some very practical lessons in decryption methods and the foolishness of placing absolute trust in any encryption program. Just how secure is your encrypted data? Maybe not as secure as you think.

DECODING WINCRYPT FILES Let's see just how difficult it is to crack a data file encrypted with WinCrypt. First, let's take a moment to review how WinCrypt works.

When you input a password, WinCrypt replicates the characters of the password to fill a 512-character array. If the password is "PCMag", the array initially looks like

PCMagPCMagPC...PCMagPCMagPC

The first element in the array holds the ASCII code for the letter P, and the 512th element holds the ASCII code for the let-

ter C. We'll call this array A.

Next, WinCrypt passes array A to a cellular-automaton routine, which rearranges the array elements. The output from the routine is another 512-byte array (array B) containing a seemingly random pattern of bits in most cases. Array B is exclusive-ORed (XORed) into array A: Where array A or array B had a 1 bit, there will be a 1 bit; otherwise, the bit will be 0. This has the result of flipping some of the bits in array A.

Then WinCrypt seeds a random-number generator with a number derived from the password and fills yet another 512-byte array (array C) with random numbers. Finally, WinCrypt XORs array C into array A, producing a sequence of 512 numbers that serves as the encryption key. To encrypt a file, WinCrypt reads the file in 512-byte blocks, XORs the bytes in the block with the bytes in the key, and then writes the XORed data back to the file.

The security of the algorithm is to some extent dependent on how successful the cellular automaton and random-number generator are at eliminating repeating patterns and leaving behind a more or less random sequence of numbers. To illustrate to you that this part of the algorithm works, Figure 1 shows a hex dump of the encryption key generated from the password "PCMag". While a file encrypted using only the characters in the password

would be easy to break, the resulting key clearly presents more of a challenge. In essence, a 5-byte key has been expanded into a 512-byte key.

There are well-established methods for cracking XOR encryption algorithms that use known key lengths, so I had no delusions that WinCrypt would be unbreakable. The expanded key length makes it harder to break and means that a person attempting to crack the code would need a proportionally larger volume of data to work with. A 500-byte ASCII text file encrypted with a 5-byte key would be trivial to crack. Cracking the same 500-byte file encrypted with a 512-byte key would be exceedingly difficult. A data file might be several kilobytes (or hundreds of kilobytes) in length, however, so a person with a rudimentary knowledge of cryptanalysis could easily decode most text files encrypted with WinCrypt. This was exactly what some of our readers pointed out.

Another issue came to light, too. Many application programs begin their data files with headers that vary little from file

to file. If the contents of this header are known and the header is at least 512 bytes long, it would be simple to derive the 512-byte encryption key by XORing an unencrypted header with the first 512 bytes of an encrypted file. Once the key is known, the remainder of the file is easily decrypted, since the same key is used throughout. Consider

Discussions regarding WinCrypt have provided some very practical lessons in decryption methods and the foolishness of placing absolute trust in any encryption program.

this excerpt from an e-mail message that came to me via the Internet:

In the July 1994 issue, you say that it is virtually impossible to reconstruct the password because of the one-way nature of the cellular automaton and the random-number generator. I agree with that. However, it would be relatively simple to reconstruct the 512-byte encryption key from an encrypted Microsoft Word for Windows file, because WinWord places a standard preamble at the beginning of every document. An XOR between the preamble and

the first 512 bytes of the encrypted document would produce the encryption key, which could then be used to decrypt the rest of the file. I would expect that other application programs use similar preambles.

To test this theory, I compared the headers of two similarly sized Word for Windows 2.0 documents. In the first 512 bytes, there were 321 matches and 191 mismatches. This means that about 63 percent of either file could be recovered intact if a user had an encrypted version of one file and an unencrypted version of the other—despite the fact that the text of the documents is completely different. That's far from perfect, but it's more than enough to provide a peek at the contents of the encrypted file.

Another reader theorized that it wouldn't be difficult to break text files lacking file headers by trying various key combinations that produce common ASCII character codes:

WinCrypt carefully reinforces the front door by using a complex method of converting a password to a key. But it leaves the back door ajar by using a simple XOR method with a repeating key. If you know some of the plaintext (the unencrypted data), you can XOR it with the ciphertext

(the encrypted data) and recover the key. Word processor files often begin with sizable headers that are the same or nearly the same for every file.

For ASCII text files, it's a little harder. You can usually guess some of the plaintext—that is, line terminators, spaces, common words and phrases, and so on. The same technique would work, provided the file size is much greater than 512 bytes.

It wasn't long before another reader, Kent Briggs, posted a program on CompuServe that decrypts ASCII text files encrypted with WinCrypt and does so without the password. The decryption method relies on the fact that a typical text file contains many characters with the values 10 (line-feeds), 13 (carriage returns), 32 (spaces), and 97 to 122 (lowercase letters). It also knows that the first byte in the encryption key is used to encrypt not only the file's 1st byte but also the 513th byte, 1,025th byte, and so on. Using this knowledge, the program works its way through the file, XORing all bytes that correspond to the same position in the key (that is, with values from 0 to 255).

The value that yields the greatest hit

count—the number of resulting bytes that equal 10, 13, 32, or are in the range 97 to 122—is assumed to be the proper key value. The result? For large ASCII files (10K or larger), the program is incredibly accurate at deciphering text encrypted by WinCrypt. Even for text files only 4K or 5K in length, it works amazingly well. To see for yourself, download WCRK10.ZIP from Library 6 (File Utilities) of CompuServe's IBMSYS forum. The program comes complete with Pascal source code.

THE CURSE OF THE REPEATING KEY

Although WinCrypt will still protect sensitive data files from run-of-the-mill PC users, it clearly will not stand up to determined attacks. This is especially true if the file size is much larger than 512 bytes and certain characteristics of the original file are known to the attacker. Generally speaking, no XOR-based encryption algorithm is safe when the key size is significantly less than the file size.

WinCrypt is not alone in this regard. In his book *Applied Cryptography* (John Wiley & Sons, 1994), Bruce Schneier claims XOR encryption algorithms are prevalent in DOS and Macintosh software programs: "The list of software vendors that tout this sort of algorithm as being 'almost as secure as DES' is staggering. It might keep your kid sister from reading your files, but it won't stop a cryptographer for more than a few minutes." He goes on to say that the only safe way to implement an XOR encryption algorithm is to ensure that the key size matches the data size and that the key is truly random. When these criteria are satisfied, attacks must be leveled against the key generator itself and not the encrypted data.

The problem with WinCrypt is the repeating 512-byte key. If the key length equaled the file length—in other words, if a new 512-byte key were generated every 512 bytes—then WinCrypt would be substantially more difficult to crack. Decryption programs such as Mr. Briggs's would not work, because there would be no relationship between disparate bytes in the file and thus no way to perform the necessary hit tests. File headers wouldn't be a problem, either, because successfully decrypting the first

```

CE 35 7F 66 60 FB AA D1-06 D8 EF FF EA D1 F1 6D .5.f`.....m
79 64 F4 1B D4 A6 F6 3D-49 4C 5E 8B F7 D5 D4 4E yd.....=IL^...N
9E FD 73 6C 56 DA 85 66-C3 E3 40 24 69 BA 86 26 ..slV..f..0$!..&
AC 41 E2 BD DF 3D FC 97-9E 7A 3C 35 E0 F9 D9 5D .A...=...z<5...]
86 D3 89 A0 55 C6 1B A8-F3 73 56 B0 9A 9E 7C BA ...U....sV...!
07 9D 33 88 AA FB C2 DE-B6 5C 1E 01 ED CB 2C E3 ..3.....\.....
A0 FA 39 47 3C 47 05 C9-D5 AD E0 CE 64 D9 F7 2A ..9G<G.....d..*
33 C0 23 21 01 8F E6 36-EA 8F B4 E6 FA AB 54 C0 3.#!...6.....T.
32 D5 06 73 24 95 D7 EC-52 7E C1 76 82 96 D8 C6 2..s$...R~.v....
36 26 E9 95 BE 7E DD 21-36 B0 79 B4 FB 3F E3 B4 6&...~.!6.y..?..
66 36 58 5C 54 3C C2 78-DC 61 BE D3 9D E6 EA AE f6X\T<.x.a.....
F2 92 6D CE 84 E9 F7 FF-C3 73 76 2B 1B D4 5C 75 ..m.....sv+..u
73 55 77 24 D6 D4 60 F8-F6 29 D3 14 33 F0 3B 25 sUw$..'.)..3.;%
23 A5 BD A1 13 82 14 2D-7B 55 5C 4B 5E AB EA 9F #.....-{U\K^...
52 B9 04 5A E2 A5 3D 5A-67 1A B8 6D 3A AA 94 12 R..Z..=Zg..m:...
89 2B 9F DE EA 87 DB DB-FE B1 0E A7 E5 8E DB EF .+.....
85 FE 70 D3 C5 76 9E 43-D8 98 7E 3F 1A 44 00 A1 ..p..v.C...~?.D..
B5 B0 70 06 5C AE B3 5E-1C EB 7C 35 0B 6B 4A 21 ..p.\..^...!5.kJ!
D8 FF 46 AC B6 BC 63 41-C2 55 D3 98 5F B1 A1 35 ..F...cA.U..._..5
C1 E8 69 0C AF 74 29 05-41 F4 52 FB 2E 44 EE 25 ..i..t).A.R..D.%
67 C6 CA A2 22 36 BC 74-C5 16 8C E1 AD 21 CC 33 g...*6.t.....!3
22 36 67 38 29 4B 6A 06-FB 0F C7 67 2E C2 30 11 *6g8)Kj....g..0.
93 4B AB A8 0B 42 41 3C-6C 92 B1 47 59 B0 50 C3 .K...BA<1..GY.P.
F6 2B 61 25 D5 9A B2 88-2E 11 5F BF DC 54 6F 1D .+a%....._..To.
AA 65 16 49 C9 28 C6 06-7B 61 E6 D0 4E 72 F4 62 .e.I.(..{a..Nr.b
88 E2 59 85 54 C2 52 F1-35 9D F1 E2 BD 52 CD 67 ..Y.T.R.5....R.g
7E 4D AB A2 F8 43 4D 36-53 23 40 1F 9D 4A 2D D7 ~M...CM6S#@..J-.
C7 52 88 07 8A 94 8B C4-6C C7 B2 7E 74 20 6C 77 .R.....l..~t lw
8B F6 FC E0 59 13 31 3C-E5 40 80 03 54 EE 23 E0 ....Y.1<.@..T.#.
34 45 8B 8C 21 3B A8 80-AE B0 14 D5 61 9A C6 BA 4E.!!;.....a...
51 4B 2E 6C D7 FC DF 3F-84 8F 69 90 DF F5 2D 84 QK.l...?..i...-.
51 18 E2 52 EF 67 37 7C-A5 8C 08 66 E7 FA 0F D9 Q..R.g7!...f....

```



Figure 1: WinCrypt generates a 512-byte encryption key containing a more or less random distribution of numbers from a password whose length may be much shorter. This hex dump shows the encryption key generated from the password "PCMag".

512 bytes would not help decrypt the rest of the file. People wishing to decrypt the file would have to attack the key-generation algorithm, and everyone seems to agree that this approach would be much more difficult.

The kicker is that a simple change to WinCrypt's source code would eliminate the repeating key. WinCrypt could, for example, pause after every 512 bytes and generate a new key, using the current key as the input instead of the array filled with password characters. Think about it: The key would in all likelihood never repeat, and each new key would be dependent on the previous one. The result would be an endless stream of pseudo-random byte values with which to encrypt the file. To a cryptographer, that's a dream come true.

So what prevents my making the change and posting a more secure version of WinCrypt on CompuServe? Simple: I don't want to go to jail. Nor do I care to become entangled in endless government red tape. For better or worse, the government restricts the export of encryption technology, including programs that perform data encryption. CompuServe is an international resource; posting a program on CompuServe could legally be construed as exportation.

PC Magazine took considerable time and expense to determine that WinCrypt wasn't subject to State Department restrictions but rather to the more flexible Commerce Department constraints. To do so, we had to demonstrate that WinCrypt was not secure enough to be subject to export restrictions. (No one outside the government knows what qualifies a program as being "too secure." The National Security Agency evaluates the difficulty in breaking the encryption and then determines whether a program is subject to State Department or Commerce Department controls.)

At one point in the process, following normal government procedures, I had to supply source code for review and fill out a questionnaire that asked among other things whether WinCrypt used a *chaining* encryption method—one that uses the output of one operation as input to the next. The implication to me was that a chaining method might not be approved, and one could argue that using the current

key to generate the subsequent key constitutes chaining. So I steered clear of this in my code.

I'm not trying to make excuses for WinCrypt. Someone would probably have broken it even if I'd souped it up with a nonrepeating key. The most frustrating aspect of it all is that I break the law if I post an enhanced version of WinCrypt without getting government approval, and getting that approval is neither a sure nor a timely proposition. If you write an encryption program that's too secure, you can't publish it—not in.....

*If you write an encryption
program that's too secure,
you can't publish it. If it's
not secure, you can publish
it, but nobody wants it
because it doesn't protect
data. Pick your poison.*

ternationally, anyway. If it's not secure, you can publish it, but nobody wants it because it doesn't protect data. Pick your poison.

ET TU RSA? No one knows how secure a cryptosystem is until it is broken. We consider the DES (Data Encryption Standard) to be secure, because it has withstood attacks of various types for about 20 years now without divulging its secrets. Still, there's no guarantee that there's not a back door that has simply been overlooked. Soon after my columns on data encryption appeared, I learned that RSA, a widely used cryptosystem believed to be among the world's most secure, had been "broken." If you're interested, you can read all about in the July 1994 issue of *Scientific American* ("Superhack").

RSA is a *public-key system*. In a public-key system, a message is encrypted with a public key, which is freely given out, and decrypted with a private key, known only to the recipient. With RSA, a user derives a public key in part by pick-

ing two very large prime numbers and multiplying them together to produce an even larger number. The security of RSA is predicated on the fact that if the product is large enough, even the fastest supercomputer would take millions of years to factor it and guess the two primes. And you need the values of the primes to compute the private key.

In the August 1977 *Scientific American*, the inventors of RSA published a short message that had been RSA-encrypted with a 129-digit public key and challenged readers to decode it. According to the more recent *Scientific American* article, a team of computer hobbyists and Internet volunteers headed by Arjen K. Lenstra, a scientist at Bell Communications Research (Bellcore), recently decoded the message after eight months of effort. How did they do it? Essentially, they divided the factoring problem into hundreds of pieces and attacked it with more than 1,600 computers simultaneously. Then they fed the results into a massively parallel supercomputer at Bellcore, which cranked out the two prime factors—one 64 digits in length, the other 65. Once the primes were known, it was a simple matter to generate the private key and decode the message.

RSA was not broken in the conventional sense. Arjen Lenstra and the others didn't find a secret back door; rather, they broke down the front door using brute force. The end result is the same, of course, and that's what matters. Does this mean that RSA is no longer viable? Far from it. It means that given enough time supercomputers can now break a 129-digit RSA code. RSA's inventors knew this would happen; they just didn't think it would happen so soon. RSA can theoretically use keys containing any number of digits, so RSA users can always stay one step ahead of the game by encoding their data with bigger public keys. What RSA users can't count on is data encrypted today still being secure 30 years from now. The same could be said of virtually any existing encryption algorithm.

And just what did the secret message in the 1977 *Scientific American* say? "THE MAGIC WORDS ARE SQUEAMISH OSSIFRAGE." You figure it out. □

Corporate Developer

BY ROBERT KENDALL

Adding Audio to Your Windows Database Interface

A sound board may not seem like an obvious enhancement to a corporate database. Yet applied intelligently, audio can make a database application easier to use—especially for inexperienced users. This column will show you how to add digital audio to your Windows

database interface to provide talking error messages. Then we'll guide you through creating an animated splash screen with music. The techniques behind these examples can be put to a variety of other uses, extending even to computer-based training and kiosk applications.

Anyone who designs databases knows how important it is to anticipate the mistakes users will make and provide them with appropriate error messages. Yet traditional error messages can easily go unnoticed in a status bar or be too obtrusive when they pop up in a dialog box. Replacing them with spoken messages may be the perfect solution.

Our examples use Paradox for Windows, though the basic principles and even some of the code can be adapted to other Windows database programs. We'll use for our examples one of the sample databases bundled with Paradox—ORDERS.DB, which contains standard order-information fields. Keeping things as simple as possible, we've created a rudimentary order entry form for this database (see Figure 1).

Paradox has no multimedia functions built into its programming language, ObjectPAL. But like some other data-

bases, it lets you call functions in DLLs (dynamic link libraries), such as MM-SYSTEM.DLL, which contains Windows's built-in multimedia functions. This lets you easily incorporate Windows API (application programming interface) functions into your code to play digital audio, MIDI music, and animations.

The first of the two API functions we'll be using is `sndPlaySound()`, which plays .WAV files. To access a Windows API function, you must first declare it in your code. In Paradox, you do this by opening the Uses Window of the object you're working with. Put your Orders Form in Design Mode, then select Properties | Form | Methods from the menus. Check the Uses box and click OK. In the editing window, edit the default text so that it looks like

```
Uses MMSYSTEM
      sndPlaySound(lpszSoundName
                  CPTR, wFlags CWORD) CWORD
endUses
```

This tells Paradox that we're accessing MMSYSTEM.DLL and using its function `sndPlaySound()`. This function can now be used just like a built-in Object-

PAL method. You should be able to use both this function and `mcSendString()` (which we'll discuss later in this column) in Microsoft Access, Microsoft Excel 5.0 (via Visual Basic, Applications Edition), and any other Windows program with an application language that supports calls to DLLs. Follow the language's syntax to declare the function and its parameters properly, replacing CPTR and CWORD with the language's keywords for string and integer data types, respectively.

TALKING PARADOX Now we'll put together our talking interface. We'll start at the most basic level by adding some data-validation procedures to a few of the fields on our Orders Form and backing them up with spoken error messages. In our example, we'll protect the user from inadvertently entering dates in `Sale_Date` or `Shipping_Date`, and we'll ensure that `Amount_Paid` is never greater than `Total_Invoice`.

The first step is to create the messages that will alert the user to mistakes. Use your microphone and the Windows

Now you can add digital audio to your Windows database interface to create talking error messages and animated splash screens complete with music.

Sound Recorder to record these three sentences: "Sale date must be today's date or earlier," "Shipping date must be today's date or earlier," and "Amount paid cannot be greater than total invoice." Save them as three .WAV files named `ERRORSD.WAV`, `ERRORSHD.WAV`, and `ERROR-AP.WAV`, respectively.

The next step is to create the appropriate error-trapping routines. In Paradox, you do this by attaching ObjectPAL code to the relevant fields. In Design Mode, right click on the `Sale_Date` field, select Methods, and double-click on `canDepart`. Insert the following after the first line of default code that appears in the editing window:

```
if Self.Value > today() then
  eventInfo.setErrorCode(CanNotDepart)
  sndPlaySound("errorsd.wav", 1)
endif
```


If the value of `Sale_Date` is later than today, this routine prevents the user from leaving the field and uses the `sndPlaySound()` function to play `ERROR-SD.WAV`.

The `sndPlaySound()` function takes two parameters: the name of a .WAV file and a number indicating how to play the file. The second parameter is actually a collection of bit flags, each of which controls one option for `sndPlaySound`. The separate flags are added together to create one number. The 1 bit controls whether the file plays asynchronously. If this bit is set On (that is, if 1 is added to the parameter), the file will play in the background; if the bit is not On, it plays synchronously, halting all other processing until the file has finished playing. Here we're employing the first option so that the user doesn't have to wait for the message to finish before getting back to work.

The 2 bit controls whether `sndPlaySound` plays the default error sound if it can't find the specified .WAV file. If this bit is set On (that is, if 2 is added to the parameter), `sndPlaySound` will *not* play the default sound. Thus passing a value of 1 either plays the file asynchronously or plays the default error sound if the file is not found. A value of 2 either plays the file synchronously or does nothing if the file is not found. There are several other flags, but they are not useful in the current application.

Figure 1: Our example Orders Form is based on the sample `ORDERS.DB` bundled with Paradox for Windows.

Here and in all the examples using `sndPlaySound()`, if your .WAV file is not in `\WINDOWS`, `\WINDOWS\SYSTEM`, or a directory on your path, the filename

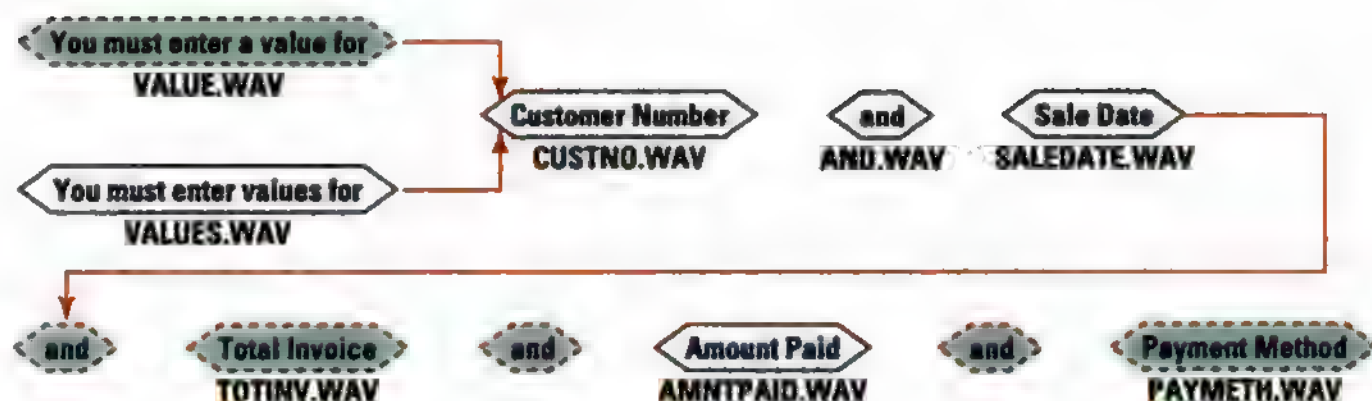


Figure 2: The recorded text fragments shown here are strung together to create a spoken error message. The solid boxes show one possible combination, while the broken boxes indicate the other possibilities.

must include the complete path. Keep in mind that ObjectPAL requires double backslashes in directory names (`c:\pdxwin\working\errorsd.wav`, for example).

Use the same procedure to attach the above code to the `Shipping_Date` field, substituting `errorshd.wav` for `errorsd.wav`. Then attach the following to `Amount_Paid`:

```
if Self.Value > Total_Invoice then
  eventInfo.setErrorCode(CanNotDepart)
  sndPlaySound("errorap.wav", 1)
endif
```

The next step is slightly more complex. We'll make the fields shown as blue boxes in Figure 1 into required fields, meaning they must be filled before Paradox allows the user to leave or save the record. If any required fields are left blank, the user will get a spoken message telling him which fields must be filled. Since there will be quite a few possible variations of this message, the best approach is to string together discrete .WAV files into the appropriate sentence, like the phone companies' recorded information messages.

Record the eight text fragments shown in Figure 2 (record "and" only once), saving each under the filename shown below it. Be careful to use a consistent recording level and speaking volume for each

file, so they sound right when strung together. In order to minimize pauses within the sentence, use the Windows Sound Recorder to trim any silences from the

beginning and the end of each file. You can do this fairly easily with the waveform viewing window, the scroll bar, and the Edit options Delete Before Current Position and Delete After Current Position.

Now we'll add the validity-checking code to the Orders Form. Select Properties | Form | Methods and double-click on Action. After the first line, insert the following to declare and initialize some variables:

```
var
  soundArray Array[5] String
  counter SmallInt
endVar
counter = 0
```

After the line of default code that reads, "This code executes only for the form," insert the code shown in Figure 3. In this code, the variable `counter` keeps track of how many required fields are blank, and the array `soundArray` stores the .WAV filenames associated with each blank field. If no fields are blank, `doDefault` saves the record or moves to the next record, depending on the user action that launched this routine. If there are blank fields, the routine first sets an error code that prevents the user from leaving the record. Then it strings together and plays the error message, getting the appropriate .WAV filenames from `soundArray` and inserting "and" in the correct place if necessary.

In the `sndPlaySound()` functions used here, the second parameter is usually 2, selecting synchronous playback and suppressing the default error sound if a file isn't found. This is necessary if each .WAV file is to play in succession, even though it freezes up the system while they


```

if eventInfo.id() = DataUnlockRecord or
eventInfo.id() = DataPostRecord then
  if Customer_No = blank() then
    counter = counter + 1
    soundArray[counter] = "custno.wav"
  endIf
  if Sale_Date = blank() then
    counter = counter + 1
    soundArray[counter] = "saledate.wav"
  endIf
  if Total_Invoice = blank() then
    counter = counter + 1
    soundArray[counter] = "totinv.wav"
  endIf
  if Amount_Paid = blank() then
    counter = counter + 1
    soundArray[counter] = "amntpaid.wav"
  endIf
  if Payment_Method = blank() then
    counter = counter + 1
    soundArray[counter] = "paymeth.wav"
  endIf
  if counter = 0 then
    doDefault
  else
    eventInfo.setErrorCode(UserError)
    switch
      case counter = 1 :
        sndPlaySound("value.wav", 2)
        sndPlaySound(soundArray[1], 1)
      case counter > 1 :
        sndPlaySound("values.wav", 2)
        for n from 1 to (counter - 1)
          sndPlaySound(soundArray[n], 2)
        endFor
        sndPlaySound("and.wav", 2)
        sndPlaySound(soundArray[counter], 1)
    endSwitch
  endIf
endIf
endIf

```

Figure 3: This code keeps track of how many required fields are blank and stores the .WAV filenames associated with each blank field. If a user tries to save a record or move to the next record and leaves a required field blank, the routine first sets an error code that prevents the user from leaving the record, then strings together and plays the error message.

are playing.

Now switch to View mode and test the form. Enter values for only some of the required fields and then try to leave edit mode or move to another record. You should hear a message prompting you to fill in the missing values (for example, "You must enter values for sale

date and amount paid").

TAKING AUDIO FURTHER Another use for audio is to replace or supplement the database program's built-in error messages that alert the user to slipups such as entering an invalid character in a numeric field or entering an invalid date. In Paradox, an audio error message can be

```

ec = errorCode()
em = errorMessage()
switch
  case ec = peInvalidChar :
    soundFile = "invalidchr.wav"
  case ec = peNotInEditMode :
    soundFile = "notedit.wav"
  case em.match("..Date..") or em.match("..Day..") or
    em.match("..Month..") or em.match("..Year..") :
    soundFile = "invalidat.wav"
  case ec = peBOF :
    soundFile = "SystemDefault"
endSwitch
If soundFile <> "" then
  sndPlaySound(soundFile, 1)
endIf
message(em)

```

Figure 4: This code traps errors generated from any field in the Orders Form and passes all error messages to Paradox's status bar.

First, we'll create messages for the errors described above. Record these sentences as three separate .WAV files: "Your entry contains an invalid character," "Your entry is not a valid date," and "You are not in edit mode; press F9." Name them INVALIDCHR.WAV, INVALIDAT.WAV, and NOTEDIT.WAV, respectively.

To implement these messages in Paradox, we'll attach ObjectPAL code to the Orders Form itself, so the same code will trap errors generated from any field in the form. In Design Mode, select Properties | Form | Methods from the menus. Double-click on the Error Method, and in the editing window, insert the following code after the first line of default code to define the variables:

```

var
  ec SmallInt
  em String
  soundFile String
endVar

```

Then insert the code shown in Figure 4 after the line of default code that reads, "This code executes only for the form." This example uses ObjectPAL's errorCode() function to intercept the error codes peInvalidChar and peNotInEditMode, which Paradox generates when a user enters an invalid character or attempts to edit a record before invoking edit mode. Detecting date-entry errors is harder, since Paradox generates different error codes for a wide variety of date-entry errors. Every date-entry error message contains the word Date, Day, Month, or Year, however, so our example detects date errors by searching the text of every message for these words. The final line of code in Figure 4 passes all error messages, including those that don't trigger an audio response, to Paradox's status bar (see Figure 5). This is important because when ObjectPAL traps for error codes, it disables all visual error messages, even ones that have nothing to do with our .WAV files.

Another error that the example above detects is an attempt to move before the first record of the database file (generating the error code peBOF). In its response to this error, our example demon-

particularly useful when a user tries to edit a record without first switching to edit mode—a common mistake that can give even the most experienced users a moment or two of head scratching. This approach requires intercepting error codes generated by the database.

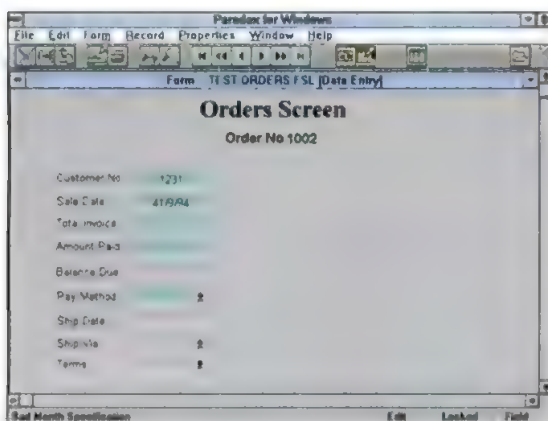


Figure 5: The invalid date entered here elicits the Paradox message shown at the bottom left. Our talking interface reinforces this with the more general message, "Your entry is not a valid date."

strates another type of audio error signal. Rather than presenting the user with a spoken message, you may prefer to tap into Windows' canned sounds for different system events.

Windows comes with a handful of .WAV files that it plays under certain conditions instead of sounding the familiar beep. If you open the Windows Control Panel and double-click on Sound, you'll see the complete list of system events and associated .WAV files. For example, by default, a ding is attached to SystemDefault, the event generated by such transgressions as clicking outside an active dialog box. Other events include starting and exiting Windows or launching a Windows application.

The `sndPlaySound()` function will accept, in lieu of a filename, the name of one of these system events as they appear in the [sounds] section of WIN.INI. Our example plays the SystemDefault sound when the user attempts to move before the beginning of a file. For a more serious error, you can use the event name SystemExclamation, which by default sounds an abrupt chord.

With the Control Panel, you can change the .WAV files associated with each system event. Any error sounds generated by your database application using `sndPlaySound()` and system event names will remain consistent with the sounds generated elsewhere in Windows by the same events.

ANIMATION AND MUSIC Now we'll explore a second Windows API function.

The `mciSendString()` function provides access to the Windows Media Control Interface (MCI) for playing MIDI files, animations, and other types of multimedia. Here we'll use it to create an animated splash screen with accompanying MIDI music.

Windows 3.1 comes with only one driver for playing animations in Macromedia Director format, but MCI drivers are available for Autodesk Animator and Gold Disk Animation Works. To play Animator Flic files—which are widely available in clip media collections—you must install the file MCI-

AAP.DRV using the Drivers applet in the Windows Control Panel.

The `mciSendString()` function takes as its parameter an MCI command string, which contains a command (such as Open, Play, or Close) and the path and name of a multimedia file. The file can be in any multimedia format for which an MCI driver is installed on your system. MCI looks at the file extension to deter-

mine which driver handles the file. To see how this works, create a new script in Paradox and edit the default code to look like the code in Figure 6. The ObjectPAL code in Figure 6 demonstrates the function by playing a Flic file and a MIDI file simultaneously.

These are just some of the many possibilities opened up by adding multimedia to a Windows database interface. In the next installment of Corporate Developer, I'll show you how to create an audiovisual help system for your database.

You can download all the code mentioned in this column from PC MagNet's Programming Forum, archived as AUDIO.ZIP. □

```
Uses MMSYSTEM
mciSendString(lpstrCommand CPTR, lpstrReturnString CPTR,
wReturnLength CWORD, hCallback CWORD) CWORD
endUses
method run(var eventInfo Event)
mciSendString("open c:\\pdxwin\\working\\midifile.mid
alias music","",0,0)
mciSendString("open c:\\pdxwin\\working\\flicfile.flc
alias flic style popup","",0,0)
mciSendString("play music","",0,0)
mciSendString("play flic wait","",0,0)
mciSendString("close flic","",0,0)
mciSendString("close music","",0,0)
endmethod
```



Figure 6: This ObjectPAL code plays a Flic file and a MIDI file simultaneously.

mine which driver handles the file. To see how this works, create a new script in Paradox and edit the default code to look like the code in Figure 6. The ObjectPAL code in Figure 6 demonstrates the function by playing a Flic file and a MIDI file simultaneously.

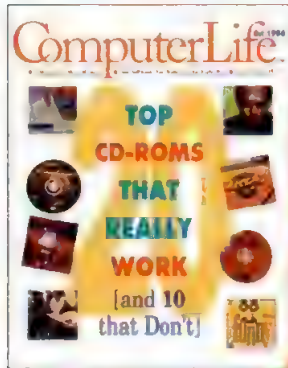
The first three lines of this code listing declare the API function `mciSendString()`. The initial instance of `mciSendString()` loads the MIDI file MIDIFILE.MID in the directory \PDOXWIN\WORKING and assigns it an alias (music), simplifying subsequent commands. (Again, ObjectPAL requires

double backslashes in the directory names.) If you want to play a .WAV file instead, all you have to do is substitute a .WAV filename for MIDIFILE.MID.

The second `mciSendString()` loads the Flic file FLICFILE.FLC, assigns it the alias flic, and specifies the window style as a pop-up (without border or title bar). If you omit style popup, the animation will run in a normal movable window. The next command starts the music playing asynchronously. The command after that includes the wait parameter to play the Flic file synchronously, halting all other processing until the animation is finished. The final two commands are then executed, terminating the music and unloading the animation. Note that when you open an MCI device with `mciSendString()`, you should always close it when you're done.

ROBERT KENDALL IS A FREELANCE WRITER, MULTIMEDIA DEVELOPER, AND FREQUENT CONTRIBUTOR TO PC MAGAZINE.

COMPUTER POWER!



STAY AT THE FOREFRONT OF THE COMPUTER REVOLUTION WITH ZIFF-DAVIS MAGAZINES.

COMPUTER LIFE

Here's the NEW magazine that helps you experience the magic of computing for yourself. Whether it's choosing, using and enjoying the best in multimedia, entertainment and games software...or adding CD-ROM, connecting online, or just getting organized — *Computer Life* helps you use your personal computer to enrich your life. Plus FREE SOFTWARE!

Call: 800-926-1578

PC MAGAZINE

It's the world's #1 information source for PC professionals, loaded with comprehensive product evaluations and benchmark test results from PC Magazine Labs — the most advanced computer product testing facility in the industry. Plus FREE SOFTWARE!

Call: 800-289-0429

PC/COMPUTING

Packed with comprehensive systems information and productivity-enhancing ideas, every issue helps you get your work done faster, smarter, and better than ever! Plus FREE SOFTWARE!

Call: 800-365-2770

MACUSER

Get concise product reviews, time-saving tips, power-boosting ideas, and new insights to help you get more out of your Mac and keep ahead of ever-changing Macintosh technology. Plus FREE SOFTWARE!

Call: 800-627-2247

WINDOWS SOURCES

Every issue is full of expert guidance, undocumented user tips, and hard-hitting details on how to choose and use the very best Windows™ products. Plus FREE SOFTWARE!

Call: 800-365-3414

COMPUTER GAMING WORLD

Get serious about playing and winning computer games with America's #1 computer game magazine. Full of special "winning secrets" for all your favorite games, on-target reviews of new games, details on multimedia, online gaming and more! Plus FREE SOFTWARE!

Call: 800-827-4450

COMPUTER SHOPPER

Every big issue delivers thousands of "smart-buy" deals on hardware, software and peripherals. It's America's largest computer marketplace!

Call: 800-274-6384



Ziff-Davis Publishing

One Park Avenue, Fifth Floor
New York, NY 10016

Please allow 30 days for delivery of first issue. If applicable, FREE software will be shipped upon payment.

Toolkits

BY NEIL J. RUBENKING

ForeHelp: Help File Heaven

If you build Microsoft Windows Help systems or hypertext documents from arcane RTF (rich text format) files, ForeHelp, Version 1.0, from ForeFront, will make you think you've died and gone to heaven (or at least to Heaven 1.0). The current trend in Help-system design is toward WYSIWYG editing, live testing at design time, and improved ease of use. ForeHelp excels in all three areas. ForeHelp will even import existing Help-project files and archive the many files that constitute a Help system's source code.

The ForeHelp editor is a WYSIWYG word processor whose features include Microsoft Word for Windows-like styles, a built-in spell-checker, and even a thesaurus. Jumps, font changes, paragraph formatting, and pop-up windows appear in the editor just as they'll appear in the final Help system, with no ugly placeholders or RTF codes. Most standard Windows Help navigation commands can be invoked without leaving the editor. Insert a bitmap and you see it immediately. Double-click on it and you can perform in-place segmented-hypergraphics (SHG) editing to assign jumps, macros, or pop-up windows to different regions of the bitmap. An advanced search-and-replace subsystem lets you turn found phrases into jumps, macros, or pop-up windows, or you can add them as keywords to the topics where they're found.

Hypertext jumps and pop-up windows hold a Help system together, and ForeHelp makes them easy. You can turn a highlighted word or phrase into a jump or pop-up window, even if you haven't yet created the destination Help topic; ForeHelp creates it for you. Choose Make Multiple Jumps from the menu to turn a highlighted list of words into a series of jumps—very handy

when building a Contents page.

Switch to test mode to see how your Help system will function under WINHELP, the Windows help engine. Test mode will even run most Windows Help macros. Before taking the time-consuming step of running the Windows Help compiler, let ForeHelp's Build command test the project thoroughly. If the Build process finds an error, you can double-click on the error message to go to the source of the error.

Common tasks such as creating browse sequences (for paging through the Help system) and keyword lists (used by WinHelp's Search function) are simple in ForeHelp—but so are advanced tasks like creating nonscrolling Help-topic header regions and secondary Help windows. ForeHelp also supports jumps that go to a location other than the top of a topic.

ForeHelp's support for Help macros is phenomenal. WinHelp's macro commands let you change the WinHelp menu and button bar, invoke Help features, and even make DLL functions accessible

to the Help system. Macros can be assigned to the whole project, to a particular topic, or to a text or graphic hot spot. When you select a macro, ForeHelp inserts the command with placeholders for the parameters—for example, CreateButton ('button-id', 'name', 'macro()'). Still more amazing, if you use the RegisterRoutine macro to make a DLL function available to your Help system, ForeHelp puts that function on the list of available macros. Register the multimedia SndPlaySound or MciExecute functions, for example, and get instant multimedia support.

ForeHelp includes several special views of your Help system. The Navigator graphically displays the jump and pop-up relationship among the various Help topics and browse sequences. ForeHelp's Grapher displays the Help-system topics in outline form. Finally, the Reporter prints or displays a report containing selected information on Help topics.

The only drawback to ForeHelp is that some of its most advanced features aren't fully explained. Version 2.0, expected this fall, should address the documentation problem and will also include enhancements such as 256-color bitmap support.

► **ForeHelp, Version 1.0** List price: \$395 (limited time offer for users of Borland's development products, \$69.95). Requires: 386-based PC or better, Microsoft Windows 3.1 or later, VGA or better, 4MB RAM, 4MB hard disk space, Microsoft Windows Help compiler. ForeFront Inc., 5171 Eldorado Springs Dr., Boulder, CO 80303; 800-357-8507, 303-499-9181; fax, 303-494-5446. Circle 441 on reader service card

OFF THE STACK

● **Alien Technologies' Advanced Toolbar Control, Version 1.5**, is a library for C++ programmers that lets you quickly add a dock area for floating toolbars, grouping multiple toolbars, user-configurable toolbars, and more. The package costs \$195 for the Microsoft Windows 3.1 libraries, \$295 for the Windows 3.1 and Windows NT libraries, and \$495 for both sets of libraries and complete source code. Alien Technologies; 919-851-9622.

Circle 442 on reader service card

● **Lenel Systems International's MediaDeveloper, Version 2.0** (\$695), lets you build multimedia applications with analog and digital video, animation, audio, and graphics. You can create thumbnails, scan system hardware, create database links, and more. OLE 2.0 automation support and drag-and-drop features let you share data with other OLE 2.0-compliant applications. DLL, OCX, and VBX versions of the library are available. Lenel Systems International Inc.; 800-225-3635, 716-248-9720.

Circle 443 on reader service card

It ain't kid stuff.

Subscribe to America's #1 Computer Game Magazine... and **Score Up to 47% Savings!**

Get serious about playing and winning computer games with Computer Gaming World. In every monthly issue, you'll —

- Discover special "winning secrets" for your favorite games
- Get "first looks" and in-depth reviews of new computer games
- Explore the latest in multimedia, CD-ROM and interactive game environments
- Leap into virtual reality with online gaming
- Turbocharge your system for faster action... and much more!

Whether you're into fantasy, action, sports or strategy. Whether you use DOS, Windows™ or a Mac...now you can start racking up the points with Computer Gaming World. Subscribe now and save!

- ☐ One year/12 issues — \$27.94 — **YOU SAVE 41%**
☐ Two years/24 issues — \$49.97 — **YOU SAVE 47%**

Savings based on annual cover price of \$47.40.



CALL NOW TOLL FREE 1-800-827-4450



To guarantee your savings, please
mention this special 4-digit code to
the operator when placing your order:
4Z94

Environments

BY CHARLES PETZOLD

Enumerating the Windows NT Enhanced Metafile

Metafiles are commonly used to store graphics images described by a series of drawing commands, such as line- and text-drawing functions. They are quite different from bitmaps, which store a graphics image as a rectangular array of pixels. In the past several installments of this column, we've been examining the enhanced metafile format implemented in Microsoft Windows NT. This new and improved metafile format fixes some of the deficiencies of the old, musty metafile format of the DOS-based versions of Windows—mostly by including an all-important header section in the metafile.

In the last column, we examined an enhanced metafile by dumping out the contents of the file itself. We saw how the metafile is divided into records, most of which correspond to GDI function calls (such as `Rectangle`). In this issue, we're going to access those individual records in a more methodical manner. We'll use some new Windows NT function calls to do this.

A BRIEF REVIEW An enhanced metafile consists of a series of variable-length records defined by the following structure in `WINGDI.H`:

```
typedef struct tagENHMETARECORD
{
    DWORD iType ;
    DWORD nSize ;
    DWORD dParm [1] ;
}
ENHMETARECORD ;
```

The `iType` field describes the record type and corresponds to identifiers beginning with the prefix `EMR` (enhanced metafile record), as defined in `WINGDI.H`. The `nSize` field indicates the total size of the metafile record in bytes. Then, depending on the record type, the record has one or more fields. For example, in an `EMR_RECTANGLE` record (corresponding to the `Rectangle` function call), there are four fields for the four parameters of the function. The total size of the record is 24 bytes. The first record in the metafile is of type `EMR_HEADER` and the last is `EMR_EOF` (end of file).

In the last issue, we were mostly concerned with how GDI objects (such as pens and brushes) are stored in the metafile. We saw that there are metafile records corresponding to the object-creation functions (such as `ExtCreatePen` and `CreateBrushIndirect`).

Each created object gets a unique number beginning with 1 and increasing sequentially. The `EMR_SELECTOBJECT` record selects the object by referencing the number. The `EMR_DELETEOBJECT` record deletes the object, also by referencing the object number.

METAFILE ENUMERATION When accessing the individual records of a metafile, you use a process called metafile enumeration. Let's jump right into this

technique by looking at the `EMF5` program shown in Figure 1. This program uses a metafile to display the same image as last issue's `EMF3` program but uses metafile enumeration.

If you have the Windows NT Software Development Kit installed, you can create `EMF5.EXE` by running

```
NMAKE EMF5.MAK
```

on a command line. Or you can download the source code and executable from PC MagNet, archived as `EMF567.ZIP`.

`EMF5`'s entire window procedure is virtually identical to `EMF3`'s. The program creates the disk-based metafile during the `WM_CREATE` message. The image consists of a rectangle with two lines connecting its opposite corners. During the `WM_PAINT` message, `EMF5` defines a rectangle in which to display the metafile image. The major difference is that `EMF3` called `PlayEnhMetaFile`, while `EMF5` calls `EnumEnhMetaFile`. You'll recall that the `PlayEnhMetaFile` function has the following syntax:

```
PlayEnhMetaFile (hdc, hemf, &rect) ;
```

The first parameter is the handle to the device context on which the metafile is to be rendered. The second parameter is a

handle to the enhanced metafile. The third parameter is a pointer to a `RECT` structure that describes a rectangle on the device-context surface. The metafile image is stretched to fit but not exceed this rectangle.

The `EnumEnhMetaFile` function has

five parameters, three of which are the same as those to `PlayEnhMetaFile` (although the pointer to the `RECT` structure has been moved to the end of the parameter list). The third parameter to `EnumEnhMetaFile` is the name of an enumeration function, which I've chosen to call `EnhMetaFileProc`. The fourth parameter is a pointer to arbitrary data you may wish to pass to the enumeration function. I've simply set this parameter to `NULL`.

In this issue, we're going to use some new Windows NT function calls to access the individual records of an enhanced metafile.

THE ENUMERATION FUNCTION Now let's take a look at the small function located just before WndProc. This is the enumeration function called EnhMetaFileProc. When you call EnumEnhMetaFile, GDI will call EnhMetaFileProc once for each record in the metafile, including the header record and the end-of-file record. Normally the enumeration function returns TRUE, but it could return FALSE to abort the enumeration process.

As I mentioned, the enumeration function has five parameters. In this program, I pass just the first four to PlayEnhMetaFileRecord, which causes GDI to execute the function call represented by that record exactly as if you had

called it explicitly.

EMF5 uses EnumEnhMetaFile and PlayEnhMetaFileRecord to get the same results EMF3 got by calling PlayEnhMetaFile. The difference is that EMF5 now has a hook into the process of metafile rendering and gets access to every metafile record.

The first parameter to the enumeration function (which in this program is called EnhMetaFileProc) is a handle to a device context. GDI simply obtains this handle from the first parameter to EnumEnhMetaFile. My enumeration function passes it on to PlayEnhMetaFileRecord to identify the device context on which the image is to be rendered.

THE METAFILE RECORD Let's skip now to the third parameter. This is a pointer to a structure of type ENHMETARECORD. This structure describes the actual metafile record exactly as it's encoded in the metafile itself.

You can write code to examine these records. You might elect not to pass some records on to the PlayEnhMetaFileRecord function. For example, in EMF5.C, try inserting the following line right before the PlayEnhMetaFileRecord call:

```
if (pEmfRecord->iType != EMR_LINETO)
```

Recompile the program, run it, and you'll see only the rectangle, not the two lines. Or try the following:

```
/*-----
EMF5.C -- Enhanced Metafile Demo #5
(c) Charles Petzold, 1994
-----*/

#include <windows.h>

LRESULT CALLBACK WndProc (HWND, UINT, WPARAM, LPARAM) ;

int WINAPI WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance,
    LPSTR lpszCmdLine, int nCmdShow)
{
    static char szAppName[] = "EMF5" ;
    HWND        hwnd ;
    MSG         msg ;
    WNDCLASS    wndclass ;

    wndclass.style          = CS_HREDRAW | CS_VREDRAW ;
    wndclass.lpfnWndProc    = WndProc ;
    wndclass.cbClsExtra     = 0 ;
    wndclass.cbWndExtra     = 0 ;
    wndclass.hInstance     = hInstance ;
    wndclass.hIcon          = LoadIcon (NULL, IDI_APPLICATION) ;
    wndclass.hCursor        = LoadCursor (NULL, IDC_ARROW) ;
    wndclass.hbrBackground = GetStockObject (WHITE_BRUSH) ;
    wndclass.lpszMenuName   = NULL ;
    wndclass.lpszClassName = szAppName ;

    RegisterClass (&wndclass) ;

    hwnd = CreateWindow (szAppName, "Enhanced Metafile Demo #5",
        WS_OVERLAPPEDWINDOW,
        CW_USEDEFAULT, CW_USEDEFAULT,
        CW_USEDEFAULT, CW_USEDEFAULT,
        NULL, NULL, hInstance, NULL) ;

    ShowWindow (hwnd, nCmdShow) ;
    UpdateWindow (hwnd) ;

    while (GetMessage (&msg, NULL, 0, 0))
    {
        TranslateMessage (&msg) ;
        DispatchMessage (&msg) ;
    }
    return msg.wParam ;
}

int CALLBACK EnhMetaFileProc (HDC hdc, HANDLETABLE * pHandleTable,
    CONST ENHMETARECORD * pEmfRecord, int
    nHandles,
    LPARAM pData)
{
    PlayEnhMetaFileRecord (hdc, pHandleTable, pEmfRecord, nHandles) ;

    return TRUE ;
}

LRESULT CALLBACK WndProc (HWND hwnd, UINT message, WPARAM wParam, LPARAM
    lParam)
{
    HDC        hdc, hdcEMF ;
    ENHMETAFILE hemf ;
    LOGBRUSH   lb ;
    PAINTSTRUCT ps ;
    RECT       rect ;

    switch (message)
    {
        case WM_CREATE:
            hdcEMF = CreateEnhMetaFile (NULL, "emf5.emf", NULL,
                "EMF5\0EMP Demo #5\0") ;

            SelectObject (hdcEMF,
                CreateSolidBrush (RGB (0, 0, 255))) ;

            lb.lbStyle = BS_SOLID ;
            lb.lbColor = RGB (255, 0, 0) ;
            lb.lbHatch = 0 ;

            SelectObject (hdcEMF,
                ExtCreatePen (PS_SOLID | PS_GEOMETRIC, 5, &lb, 0,
                    NULL)) ;

            Rectangle (hdcEMF, 100, 100, 201, 201) ;

            MoveToEx (hdcEMF, 100, 100, NULL) ;
            LineTo (hdcEMF, 200, 200) ;

            MoveToEx (hdcEMF, 200, 100, NULL) ;
            LineTo (hdcEMF, 100, 200) ;

            DeleteObject (
                SelectObject (hdcEMF,
                    GetStockObject (BLACK_PEN))) ;

            DeleteObject (
                SelectObject (hdcEMF,
                    GetStockObject (WHITE_BRUSH))) ;

            hemf = CloseEnhMetaFile (hdcEMF) ;

            DeleteEnhMetaFile (hemf) ;
            return 0 ;

        case WM_PAINT:
            hdc = BeginPaint (hwnd, &ps) ;

            GetClientRect (hwnd, &rect) ;

            rect.left   = rect.right / 4 ;
            rect.right  = 3 * rect.right / 4 ;
            rect.top    = rect.bottom / 4 ;
            rect.bottom = 3 * rect.bottom / 4 ;

            hemf = GetEnhMetaFile ("emf5.emf") ;

            EnumEnhMetaFile (hdc, hemf, EnhMetaFileProc, NULL,
                &rect) ;

            DeleteEnhMetaFile (hemf) ;

            EndPaint (hwnd, &ps) ;
            return 0 ;

        case WM_DESTROY:
            PostQuitMessage (0) ;
            return 0 ;
    }
    return DefWindowProc (hwnd, message, wParam, lParam) ;
}
```

```
switch (message)
{
    case WM_CREATE:
        hdcEMF = CreateEnhMetaFile (NULL, "emf5.emf", NULL,
            "EMF5\0EMP Demo #5\0") ;

        SelectObject (hdcEMF,
            CreateSolidBrush (RGB (0, 0, 255))) ;

        lb.lbStyle = BS_SOLID ;
        lb.lbColor = RGB (255, 0, 0) ;
        lb.lbHatch = 0 ;

        SelectObject (hdcEMF,
            ExtCreatePen (PS_SOLID | PS_GEOMETRIC, 5, &lb, 0,
                NULL)) ;

        Rectangle (hdcEMF, 100, 100, 201, 201) ;

        MoveToEx (hdcEMF, 100, 100, NULL) ;
        LineTo (hdcEMF, 200, 200) ;

        MoveToEx (hdcEMF, 200, 100, NULL) ;
        LineTo (hdcEMF, 100, 200) ;

        DeleteObject (
            SelectObject (hdcEMF,
                GetStockObject (BLACK_PEN))) ;

        DeleteObject (
            SelectObject (hdcEMF,
                GetStockObject (WHITE_BRUSH))) ;

        hemf = CloseEnhMetaFile (hdcEMF) ;

        DeleteEnhMetaFile (hemf) ;
        return 0 ;

    case WM_PAINT:
        hdc = BeginPaint (hwnd, &ps) ;

        GetClientRect (hwnd, &rect) ;

        rect.left   = rect.right / 4 ;
        rect.right  = 3 * rect.right / 4 ;
        rect.top    = rect.bottom / 4 ;
        rect.bottom = 3 * rect.bottom / 4 ;

        hemf = GetEnhMetaFile ("emf5.emf") ;

        EnumEnhMetaFile (hdc, hemf, EnhMetaFileProc, NULL,
            &rect) ;

        DeleteEnhMetaFile (hemf) ;

        EndPaint (hwnd, &ps) ;
        return 0 ;

    case WM_DESTROY:
        PostQuitMessage (0) ;
        return 0 ;
}
return DefWindowProc (hwnd, message, wParam, lParam) ;
}
```



Figure 1: EMF5.C shows how to create a disk-based metafile and play it using metafile enumeration.

```
if (pEmfRecord->iType !=
    EMR_SELECTOBJECT)
```

This little change causes the image to be rendered with default objects—not with the pen and brush we've created.

One thing you may *not* do is modify the metafile record. But before you get upset about this restriction, let's take a look at the EMF6 program in Figure 2.

If you want to modify metafile records

before rendering them, there's a fairly simple solution. As you can see, the enumeration procedure begins by using malloc to allocate a block of memory the size of the metafile record, which is indicated by the nSize field of the pEmfRecord structure passed to the function. A pointer to this block is saved in the variable pEmfr, which is a pointer to an ENHMETARECORD structure.

Using memcpy, the program copies

the contents of the structure pointed to by pEmfRecord to the structure pEmfr points to. Now we have something that we can alter. The program checks if the record is of type EMR_RECTANGLE and, if so, replaces the iType field with EMR_ELLIPSE. The pEmfr pointer is passed to PlayEnhMetaFileRecord and then freed. The program will now draw an ellipse rather than a rectangle. Everything else is the same.

```
/*-----
EMF6.C -- Enhanced Metafile Demo #6
(c) Charles Petzold, 1994
-----*/

#include <windows.h>
#include <stdlib.h>

LRESULT CALLBACK WndProc (HWND, UINT, WPARAM, LPARAM);

int WINAPI WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance,
    LPSTR lpszCmdLine, int nCmdShow)
{
    static char szAppName[] = "EMF6";
    HWND hwnd;
    MSG msg;
    WNDCLASS wndclass;

    wndclass.style = CS_HREDRAW | CS_VREDRAW;
    wndclass.lpfnWndProc = WndProc;
    wndclass.cbClsExtra = 0;
    wndclass.cbWndExtra = 0;
    wndclass.hInstance = hInstance;
    wndclass.hIcon = LoadIcon (NULL, IDI_APPLICATION);
    wndclass.hCursor = LoadCursor (NULL, IDC_ARROW);
    wndclass.hbrBackground = GetStockObject (WHITE_BRUSH);
    wndclass.lpszMenuName = NULL;
    wndclass.lpszClassName = szAppName;

    RegisterClass (&wndclass);

    hwnd = CreateWindow (szAppName, "Enhanced Metafile Demo #6",
        WS_OVERLAPPEDWINDOW,
        CW_USEDEFAULT, CW_USEDEFAULT,
        CW_USEDEFAULT, CW_USEDEFAULT,
        NULL, NULL, hInstance, NULL);

    ShowWindow (hwnd, nCmdShow);
    UpdateWindow (hwnd);

    while (GetMessage (&msg, NULL, 0, 0))
    {
        TranslateMessage (&msg);
        DispatchMessage (&msg);
    }
    return msg.wParam;
}

int CALLBACK EnhMetaFileProc (HDC hdc, HANDLETABLE * pHandleTable,
    CONST ENHMETARECORD * pEmfRecord, int
    nHandles,
    LPARAM pData)
{
    ENHMETARECORD * pEmfr;

    pEmfr = (ENHMETARECORD *) malloc (pEmfRecord->nSize);

    memcpy (pEmfr, pEmfRecord, pEmfRecord->nSize);

    if (pEmfr->iType == EMR_RECTANGLE)
    {
        PlayEnhMetaFileRecord (hdc, pHandleTable, pEmfr, nHandles);

        pEmfr->iType = EMR_ELLIPSE;
    }

    PlayEnhMetaFileRecord (hdc, pHandleTable, pEmfr, nHandles);

    free (pEmfr);

    return TRUE;
}

LRESULT CALLBACK WndProc (HWND hwnd, UINT message, WPARAM wParam, LPARAM
    lParam)
{

```

```
HDC hdc, hdcEmf;
HENHMETAFILE hemf;
LOGBRUSH lb;
PAINTSTRUCT ps;
RECT rect;

switch (message)
{
    case WM_CREATE:
        hdcEmf = CreateEnhMetaFile (NULL, "emf6.emf", NULL,
            "EMF6\EMF Demo #6\0");

        SelectObject (hdcEmf,
            CreateSolidBrush (RGB (0, 0, 255)));

        lb.lbStyle = BS_SOLID;
        lb.lbColor = RGB (255, 0, 0);
        lb.lbHatch = 0;

        SelectObject (hdcEmf,
            ExtCreatePen (PS_SOLID | PS_GEOMETRIC, 5, &lb, 0,
                NULL));

        Rectangle (hdcEmf, 100, 100, 200, 200);

        MoveToEx (hdcEmf, 100, 100, NULL);
        LineTo (hdcEmf, 200, 200);

        MoveToEx (hdcEmf, 200, 100, NULL);
        LineTo (hdcEmf, 100, 200);

        DeleteObject (
            SelectObject (hdcEmf,
                GetStockObject (BLACK_PEN)));

        DeleteObject (
            SelectObject (hdcEmf,
                GetStockObject (WHITE_BRUSH)));

        hemf = CloseEnhMetaFile (hdcEmf);

        DeleteEnhMetaFile (hemf);
        return 0;

    case WM_PAINT:
        hdc = BeginPaint (hwnd, &ps);

        GetClientRect (hwnd, &rect);

        rect.left = rect.right / 4;
        rect.right = 3 * rect.right / 4;
        rect.top = rect.bottom / 4;
        rect.bottom = 3 * rect.bottom / 4;

        hemf = GetEnhMetaFile ("emf6.emf");

        EnumEnhMetaFile (hdc, hemf, EnhMetaFileProc, NULL,
            &rect);

        DeleteEnhMetaFile (hemf);

        EndPaint (hwnd, &ps);
        return 0;

    case WM_DESTROY:
        PostQuitMessage (0);
        return 0;
}

return DefWindowProc (hwnd, message, wParam, lParam);
}
```

Figure 2: EMF6.C demonstrates how to modify metafile records with a metafile enumeration function.




```

/*-----
EMF7.C -- Enhanced Metafile Demo #7
(c) Charles Petzold, 1994
-----*/

#include <windows.h>

LRESULT CALLBACK WndProc (HWND, UINT, WPARAM, LPARAM) ;

int WINAPI WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance,
    LPSTR lpszCmdLine, int nCmdShow)
{
    static char szAppName[] = "EMF7" ;
    HWND        hwnd ;
    MSG         msg ;
    WNDCLASS    wndclass ;

    wndclass.style          = CS_HREDRAW | CS_VREDRAW ;
    wndclass.lpfnWndProc    = WndProc ;
    wndclass.cbClsExtra     = 0 ;
    wndclass.cbWndExtra     = 0 ;
    wndclass.hInstance     = hInstance ;
    wndclass.hIcon          = LoadIcon (NULL, IDI_APPLICATION) ;
    wndclass.hCursor        = LoadCursor (NULL, IDC_ARROW) ;
    wndclass.hbrBackground  = GetStockObject (WHITE_BRUSH) ;
    wndclass.lpszMenuName   = NULL ;
    wndclass.lpszClassName = szAppName ;

    RegisterClass (&wndclass) ;

    hwnd = CreateWindow (szAppName, "Enhanced Metafile Demo #7",
        WS_OVERLAPPEDWINDOW,
        CW_USEDEFAULT, CW_USEDEFAULT,
        CW_USEDEFAULT, CW_USEDEFAULT,
        NULL, NULL, hInstance, NULL) ;

    ShowWindow (hwnd, nCmdShow) ;
    UpdateWindow (hwnd) ;

    while (GetMessage (&msg, NULL, 0, 0))
    {
        TranslateMessage (&msg) ;
        DispatchMessage (&msg) ;
    }
    return msg.wParam ;
}

int CALLBACK EnhMetaFileProc (HDC hdc, HANDLETABLE * pHandleTable,
    CONST ENHMETARECORD * pEmfRecord, int
    nHandles,
    LPARAM pData)
{
    HBRUSH hBrush ;
    HPEN    hPen ;
    LOGBRUSH lb ;

    if (pEmfRecord->iType != EMR_HEADER && pEmfRecord->iType != EMR_EOF)
        PlayEnhMetaFileRecord (hdc, pHandleTable, pEmfRecord,
            nHandles) ;

    if (pEmfRecord->iType == EMR_RECTANGLE)
    {
        hBrush = SelectObject (hdc, GetStockObject (NULL_BRUSH)) ;

        lb.lbStyle = BS_SOLID ;
        lb.lbColor = RGB (0, 255, 0) ;
        lb.lbHatch = 0 ;

        hPen = SelectObject (hdc,
            ExtCreatePen (PS_SOLID | PS_GEOMETRIC, 5, &lb, 0,
                NULL)) ;

        Ellipse (hdc, 100, 100, 200, 200) ;

        DeleteObject (SelectObject (hdc, hPen)) ;

        SelectObject (hdc, hBrush) ;
    }

    return TRUE ;
}

LRESULT CALLBACK WndProc (HWND hwnd, UINT message, WPARAM wParam,
    LPARAM lParam)
{
    ENHMETAHEADER emh ;
    HDC            hdc, hdcEMF ;
    ENHMETAFILE    hemfOld, hemf ;
    PAINTSTRUCT    ps ;
    RECT           rect ;

    switch (message)
    {
        case WM_CREATE:
            // Retrieve existing metafile and header
            hemfOld = GetEnhMetaFile ("emf6.emf") ;
            GetEnhMetaFileHeader (hemfOld, sizeof (ENHMETAHEADER),
                &emh) ;

            // Create a new metafile DC
            hdcEMF = CreateEnhMetaFile (NULL, "emf7.emf", NULL,
                "EMF7\0EMF Demo #7\0") ;

            // Enumerate the existing metafile
            EnumEnhMetaFile (hdcEMF, hemfOld, EnhMetaFileProc, NULL,
                (RECT *) &emh.rc1Bounds) ;

            // Clean up
            hemf = CloseEnhMetaFile (hdcEMF) ;

            DeleteEnhMetaFile (hemfOld) ;
            DeleteEnhMetaFile (hemf) ;

            DeleteEnhMetaFile (hemf) ;
            return 0 ;

        case WM_PAINT:
            hdc = BeginPaint (hwnd, &ps) ;

            GetClientRect (hwnd, &rect) ;

            rect.left  = rect.right / 4 ;
            rect.right = 3 * rect.right / 4 ;
            rect.top   = rect.bottom / 4 ;
            rect.bottom = 3 * rect.bottom / 4 ;

            hemf = GetEnhMetaFile ("emf7.emf") ;

            PlayEnhMetaFile (hdc, hemf, &rect) ;

            DeleteEnhMetaFile (hemf) ;

            EndPaint (hwnd, &ps) ;
            return 0 ;

        case WM_DESTROY:
            PostQuitMessage (0) ;
            return 0 ;
    }
    return DefWindowProc (hwnd, message, wParam, lParam) ;
}

```

Figure 3: EMF7.C demonstrates how to imbed new drawing commands in an existing metafile.

Of course, our little alteration worked quite easily because the Rectangle and Ellipse functions have the same parameters—a bounding box for the figure. Making more extensive alterations requires some knowledge about the formats of the various metafile records.

Another possibility is to slip in an extra record or two. For example, replace the if statement in EMF6.C with

```

if (pEmfr->iType == EMR_RECTANGLE)
{
    PlayEnhMetaFileRecord (hdc,
        pHandleTable, pEmfr, nObjects) ;
    pEmfr->iType = EMR_ELLIPSE ;
}

```

Whenever the program encounters a Rectangle record, it renders that record and then changes the record to an Ellipse,

which is also rendered. Now the program draws both a rectangle and an ellipse. Later on in this column, we'll see how to use GDI function calls to insert new records into existing metafiles.

THE OBJECT TABLE Let's examine now how GDI objects are dealt with when you enumerate a metafile. As we've seen, the metafile begins with a structure of type ENHMETAHEADER, which describes



the metafile header. This is the first metafile record the enumeration function receives, and it is identified by an `iType` field of `EMR_HEADER`.

The `nHandles` field of the `ENH-METAHEADER` structure equals the number of GDI objects created in the metafile plus one. Thus, for the metafiles in EMF5 and EMF6, this field is three, accounting for the pen, the brush, and something else. What this something else really is, I'll reveal shortly. You'll notice that the penultimate parameters to the enumeration functions in EMF5 and EMF6 are also called `nHandles`. They'll be the same number—three.

The second parameter to the enumeration function is a pointer to a structure called `HANDLETABLE`, which is defined in `WINGDI.H` as

```
typedef struct tagHANDLETABLE
{
    HGDIOBJ objectHandle [1] ;
}
HANDLETABLE ;
```

The `HGDIOBJ` data type is a generalized handle to a GDI object and is defined as a 32-bit pointer—like all the other GDI objects. As you'll note, this is one of those structures with an array field of just one element, which means the structure's length is variable. The number of elements in the `objectHandle` array is equal to `nHandles`; in the case of our programs, `nHandles` is three.

Within the enumeration function, these handles can be obtained using the expression

```
pHandleTable->objectHandle[i]
```

where *i* is either 0, 1, or 2 for the 3 handles. Whenever the enumeration function is called, the first element of the array will contain the handle to the metafile being enumerated. That's the something else that I referred to above.

When the enumeration function is first called, the second and third elements of the table will be 0. These are placeholders for the handles of the brush and the pen.

Here's how the process works: The first object-creation function in the metafile has a record type of `EMR_CRE-`

`ATEBRUSHINDIRECT`. This record indicates an object number of 1. When the record is passed to `PlayEnhMetaFileRecord`, GDI creates the brush and obtains a handle to it. This handle is stored as element 1 (the second element) of the `objectHandle` array. When the first



Figure 4: The EMF7 display shows an ellipse inserted in an existing metafile.

`EMR_SELECTOBJECT` record is passed to `PlayEnhMetaFileRecord`, GDI notes that the handle number is 1, retrieves the actual handle from the table, and uses it in a `SelectObject` call. When the metafile eventually deletes the brush, GDI sets element 1 of the `objectHandle` array back to 0.

By accessing the `objectHandle` array, you can use calls such as `GetObjectType` and `GetObject` to obtain information about the objects used in the metafile.

EMBEDDING IMAGES Perhaps the most important use of metafile enumeration is to embed other images (or even entire metafiles) in an existing metafile. The existing metafile actually remains unchanged; what you're really doing is creating a new metafile that combines the existing metafile and the new embedded images. The basic trick is to pass a metafile device-context handle as the first parameter to `EnumEnhMetaFile`. This allows you to render both metafile records and GDI function calls on the metafile device context.

It's easiest to embed new images at the beginning or end of the metafile command sequence—that is, right after the `EMR_HEADER` record or right before the `EMF_EOF` record. But if you're familiar with the existing metafile, you can embed new drawing commands anywhere. That's what's done in the EMF7 program shown in Figure 3. EMF7 uses the EMF6.EMF metafile created by the

EMF6 program, so be sure to run that program to create the metafile before you run EMF7.

Although `WM_PAINT` processing in EMF7 reverted back to `PlayEnhMetaFile` rather than `EnumEnhMetaFile`, `WM_CREATE` processing is quite different. First, the program obtains a metafile handle for the EMF6.EMF file by calling `GetEnhMetaFile`. It also gets the enhanced metafile header by calling `GetEnhMetaFileHeader`. The sole purpose of getting the header is to use the `rclBounds` field in the forthcoming `EnumEnhMetaFile` call.

Next, the program creates a new disk-based metafile to be stored as EMF7.EMF. After that, the `CreateEnhMetaFile` function returns a device-context handle for the metafile. Then `EnumEnhMetaFile` is called using the metafile device-context handle for EMF7.EMF along with the metafile handle from EMF6.EMF.

Now let's take a look at `EnhMetaFileProc`. If the record being enumerated is not the header or the end-of-file record, then the function calls `PlayEnhMetaFileRecord` to transfer the record into the new metafile device context. Although it's not strictly necessary to exclude the header or end-of-file records, they do make the metafile somewhat larger.

If the record just transferred is the `Rectangle` call, then the function creates a pen to draw an ellipse with a green outline and a transparent interior. Notice how the code restores the state of the device context by saving the previous pen and brush handles. During this time, all these functions are inserted into the metafile. Keep in mind that you can also use `PlayEnhMetaFile` to insert an entire metafile in the existing one.

Back in `WM_CREATE` processing, the program calls `CloseEnhMetaFile` to obtain a handle to the new metafile. Then it deletes both metafile handles, leaving the EMF6.EMF and EMF7.EMF files on disk. And it works, as we can see in Figure 4. Close inspection shows that the ellipse is drawn after the rectangle but before the two crisscrossing lines.

In the next issue, we'll explore the sizes of metafile images and how to use them properly. □

MEET THE GREAT IN COMPUTER PR

THEY DON'T cold call. They don't work on commission. They've never even closed a deal. But when it comes to choosing computer products, buyers rely on them more than any other source.

Introducing the testing experts at Ziff-Davis. Working for ZD Labs and four individual magazine labs, they provide the most comprehensive, reliable product

information in the computer industry.

Which is what attracts more business buyers to Ziff-Davis magazines.

And leads to more sales for our advertisers.

Ziff-Davis magazines attract more business buyers with the industry's most comprehensive and reliable computer product reviews.

in Ziff-Davis magazines than in all other major computer publications combined, a sure indication of their effectiveness in reaching serious, active buyers.



The test results more buyers depend on.

The computer market is changing faster than ever, with new technologies and new products being introduced nearly every day. To keep up, buyers require extensive qualitative—and quantitative—information to make the right purchasing decisions.

That's why Ziff-Davis has invested heavily in state-of-the-art, scientific

product testing. We've built and staffed four magazine-specific labs in addition to ZD Labs, the largest independent computer testing facility in the world. Together these labs perform complex tests on thousands of hardware and software products, fashioning each test script to the editorial perspective of each magazine. The results form the basis for the product reviews which appear in every Ziff-Davis magazine, and which have become worldwide industry standards.

BEST SALES TEAM PRODUCT HISTORY.



Specific labs for specific buyers.

Some buyers require comprehensive, comparative evaluations. Others need an immediate first look that's accurate. And still others need to know how products will perform when actual users get their hands on them. So we've designed our five labs to

precisely meet their varied needs.

No other publisher, indeed no other company, makes such a commitment to labs-based product reviews.

No wonder buyers in over 60

independent studies have consistently indicated that they rely on Ziff-Davis magazines more than any other publications.



Great buyers make for great numbers.

Incomparable product testing is just one of the reasons Ziff-Davis magazines are the overwhelming choice of computer product buyers. Outstanding editors fashion needed buying information into the most powerful magnet for buyers. Proof: total circulation for our seven business publications is at an all time high of 3,480,400¹—up a remarkable 30.8% in the last 2 years.



PCWEEKLABS



And a great place for advertising.

When you're the gathering place for the greatest market of buyers, it shows in your ad lineage. In the first 5 months of 1994 advertisers placed 46% of their pages in seven Ziff-Davis magazines, with the rest scattered among 15 other computer publications.²

So when you're looking for the publications that are most effective in reaching more buyers, look no further. The test results are in: Ziff-Davis is at the top of the charts.

Call 212-503-5650 for more information.

ZD The Ziff-Davis
Magazine Networks

CIRCLE 354 ON READER SERVICE CARD

Utilities

BY ROBERT LAUSEVIC

PasteBoard: A Step Beyond the Clipboard

You're doing some extensive cutting and pasting in your favorite Windows-based word processor and finding it to be a rather tedious undertaking. Maybe you're compiling information from several articles. You switch to one of your source documents, copy a section, and paste it into the new one. Then you switch to another document, copy, and switch back to the new document. Or maybe you're programming your latest and greatest creation and realize you'd like to use some functions from previous programs. Wouldn't it be great if you could do all your copying without switching and then paste all at once? PasteBoard, this issue's utility, allows you to do just that with minimal interruption of your work.

The problem with the Windows Clipboard is that every time anything is copied or cut to the Clipboard, its previous contents are replaced. This means you can cut and paste only contiguous portions of text at a time. PasteBoard works around this Windows deficiency by keeping a pasteboard in addition to the Clipboard. Rather than replacing text, each successive block of text copied to the Clipboard is concatenated onto the text already in the pasteboard. Once PasteBoard has been launched, any cutting or copying of text you do within Windows is captured without any extra mousing or keystrokes.

Instead of the .CLP files used by the Clipboard Viewer, PasteBoard works with pure ASCII files. Although it does

not have the Clipboard's ability to store binary data such as bitmaps, PasteBoard adds editing capability. You can edit the pasteboard text, save it to a file, or load a file into the pasteboard.

PasteBoard is written in Microsoft Visual Basic, Version 3.0. You can obtain your own copy of PasteBoard and its source code by downloading the files from PC MagNet or by mail. If you already have Version 3.0 installed on your system, you need only download PASTE.ZIP from Library 2 of the Utilities/Tips Forum or Library 2 of the Programming Forum. If you don't already have Version 3.0 on your system, you will also need to download VBRUN300.DLL (VBRUN3.ZIP) from Library 15 and CMDIALOG.VBX (CMDIAL.ZIP)

from Library 10 and copy them to your Windows system directory. Both of these files can be obtained from Library 10 of the Utilities/Tips Forum. For details on joining ZiffNet, see the sidebar "Guide to Our Utilities & How to Get Them."

USING PASTEBOARD To use PasteBoard, simply launch it and then use your word processor or text editor as you would normally. Without any extra effort on your part, every cut or copy is automatically stored in the pasteboard.

When you're ready to paste the text you've collected, switch to PasteBoard. Figure 1 shows PasteBoard's screen. You'll notice that except for the split bar in the middle of the window, it looks very similar to the Windows Clipboard. The top half of the window shows the text in the Clipboard, while the bottom half shows the text in the pasteboard. The split bar can be moved up and down with the mouse, allowing you to decide how to divide the window between the Clipboard text and the pasteboard text. If you want, you can drag the split bar all the way to the top or bottom to show only the pasteboard or only the Clipboard.

To paste the entire contents of the pasteboard, choose Copy All to Clipboard from the Edit menu, then switch back to your word processor and paste. If you like, you can edit the text in the pasteboard before copying it to the Clipboard. To copy only a portion of the text from the pasteboard, highlight the part you want to copy and choose Copy to Clipboard from the Edit menu.

One important point to note is that the pasteboard section is limited to 30,000 characters. When you've passed this limit, PasteBoard will store only the most recent 30,000 characters copied, discarding the oldest characters.

If you want to save the pasteboard text to a file, choose Save As... from the File menu. You can load almost 30K of text into the pasteboard by choosing Open... from the File menu. When you do this, however, any text you already had in the pasteboard will be lost.

There are just a few remaining menu items. Clear Clipboard clears the Clipboard (the upper half of the PasteBoard window), and Clear Pasteboard clears the pasteboard (the lower half of the PasteBoard window). On the Display menu,

Top 10 Utilities

Rank	Utility
1	WINCMD - Command file interpreter
2	WCLIB - DLL for WINCMD
3	WTIME - Keeps PC clock accurate
4	FINDIR - IRQ line analysis
5	MONITOR - Monitors system resources
6	BAT2EX - Compiles batch files
7	INCTRL - Controls Windows installation
8	BUGS - Windows 3.1 screen saver
9	CONFIX - Issues commands at boot time
10	THIND1 - Windows file analysis

This list is based on the total number of downloads each utility has had on PC MagNet over the past month. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

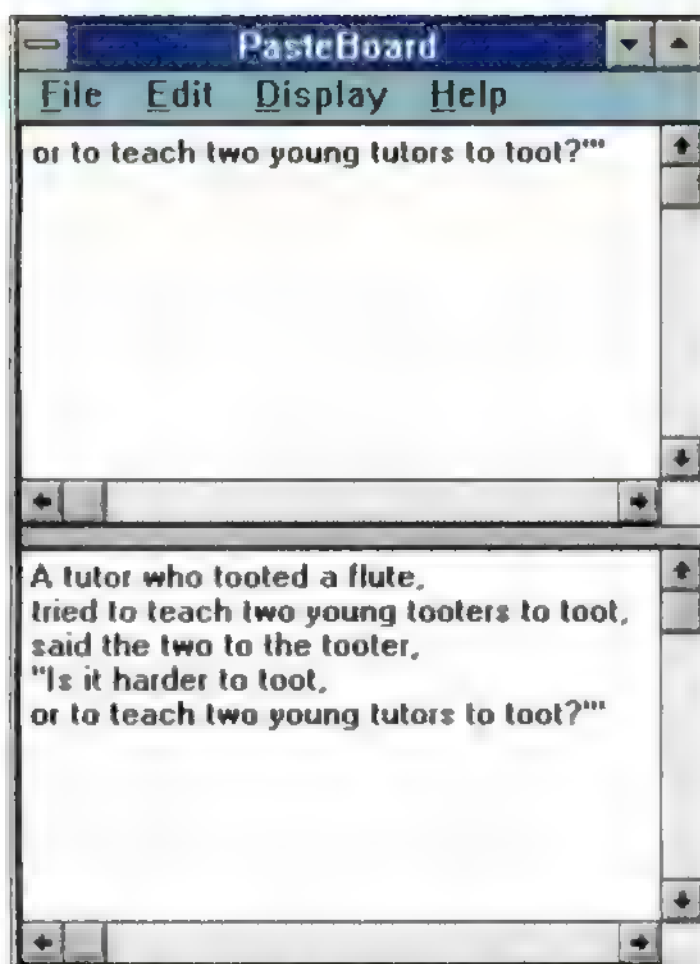


Figure 1: PasteBoard uses a split screen that displays Clipboard text in the top window and pasteboard text in the bottom window.

the Text option displays the text using the standard Windows proportional font; the Fixed Text option displays the text in a fixed-width font. This is different from the Clipboard Viewer option, OEM Text, which displays text in a fixed-width font with DOS extended characters. Select How To... from the Help menu for a basic rundown of how to use PasteBoard.

PasteBoard is especially handy for copying screen information from DOS programs run from within Windows. One method is to run the DOS program in full-screen mode and press the **PrtSc** key. This copies all the text on the screen to the Clipboard. If you want to copy only part of the screen, run the DOS program in a window and choose **Edit | Mark** from the system menu. Use the mouse or shifted cursor keys to highlight an area and then press **Enter** to copy it.

The **PrtSc** method is easier, though. By scrolling down and repeatedly pressing **PrtSc**, you can get the full text of many DOS screens with less effort than copying from a Windows program. Also, you don't have to worry about pressing **PrtSc** multiple times for the same screen, since PasteBoard simply copies new information from the Clipboard. If the information in the Clipboard has not changed since the last time PasteBoard checked, the Clipboard is not copied.

If you ever feel that one pasteboard is not enough, more than one copy of PasteBoard can run at the same time. Using this feature, you can keep different versions of the text in different pasteboards. One pasteboard might have all your cuts and copies, while another has only the last few. Launching multiple pasteboards is also useful for splitting a text file into chunks. Use one pasteboard as a source and copy selections to the Clipboard. Then use the other pasteboard to save the selection to a new text file.

PROGRAMMING PASTEBOARD You'll be surprised how easy it is to program a handy Windows utility like PasteBoard using Visual Basic. The whole program is under 100 lines of code!

PasteBoard works by appending new text stored in the Clipboard to the pasteboard. The only way to know if new information has been stored in the Clipboard is to check it periodically. I do this with Visual Basic's Timer control, which lets you run code on a periodic basis by generating events. The amount of time between events can be set to anywhere from 1 to 65,535 milliseconds.

For PasteBoard, I set the Timer's Interval property to 100 milliseconds so that an event would be generated approximately 10 times per second. This is frequent enough that the user won't notice a lag in copying the Clipboard text to the pasteboard; yet it does not execute often enough to cause a noticeable performance decrease.

The **Timer1_Timer** subroutine in Figure 2 shows the code needed to accomplish this task. The first **If** statement checks to see if there is text in the Clipboard (as opposed to graphics, for example) and if that text has changed since the Clipboard has last been copied. The routine then copies the Clipboard contents to the top half of PasteBoard (text box **Text1**), replacing whatever

was there before. The second **If** appends the new text to the end of the pasteboard section (text box **Text2**) if the text in the Clipboard did not originate within PasteBoard. Since the value of **MaxLen%** is 30,000 (the maximum editable capacity of a VB text box), only the 30,000 most recently copied characters are kept.

The remaining code in Figure 2 shows the four procedures that are called when the corresponding Edit menu items are selected: **Clear Clipboard**, **Clear Pasteboard**, **Copy All to Clipboard**, and **Copy to Clipboard**. As you can see from the brevity of the code, utilizing the Clipboard in VB is quite easy. The **mClearClip** and **mClearPaste** procedures remove all text from the Clipboard and pasteboard. The **mCopyAll** and **mCopy** procedures use the Clipboard's **SetText** method to put text in the Clipboard. The **mCopyAll** procedure passes all the text from the pasteboard to the Clipboard, while **mCopy** copies only the highlighted text by using the **SelText** property. You'll also notice that the form-level flag variable **PasteToClip\$** is set to prevent copy-

```
Sub Timer1_Timer ()
    'Check 10 times a second if there
    'is new text in the Clipboard...
    If Clipboard.GetFormat(CF_TEXT) And
        Clipboard.GetText(CF_TEXT) <> Text1.Text Then
        'Display clip
        Text1.Text = Clipboard.GetText(CF_TEXT)
        If PasteToClip$ = "" Then
            'Add to pasteboard
            Text2.Text = Right$(Text2.Text +
                Text1.Text, MaxLen%)
        Else
            PasteToClip$ = ""
        End If
    End If
End Sub

Sub mClearClip_Click ()
    'Menu Edit/Clear Clipboard
    Clipboard.Clear
    Text1.Text = ""
End Sub

Sub mClearPaste_Click ()
    'Menu Edit/Clear Pasteboard
    Text2.Text = ""
End Sub

Sub mCopyAll_Click ()
    'Menu Edit/Copy All to clipboard
    PasteToClip$ = Text2.Text
    Clipboard.SetText Text2.Text
End Sub

Sub mCopy_Click ()
    'Menu Edit/Copy to clipboard
    PasteToClip$ = Text2.SelText
    Clipboard.SetText Text2.SelText
End Sub
```

Figure 2: These routines are used to capture, clear, and move text between the Clipboard and pasteboard.




```
Sub Text1_DragDrop (Source As Control, X As Single, Y As Single)
    If Y > 0 Then
        Picture1.Top = Y 'Move Splitter
        Form_Resize
    End If
End Sub

Sub Text2_DragDrop (Source As Control, X As Single, Y As Single)
    If Y < Text2.Height Then
        Picture1.Top = Y + Text2.Top - Picture1.Height 'Move Splitter
        Form_Resize
    End If
End Sub

Sub Form_Resize ()
    'If minimized then get out!
    If Paste.WindowState = MINIMIZED Then Exit Sub
    'In case the window is smaller than the Splitter then
    'make it at least as big as the form caption + the splitter.
    If Paste.ScaleHeight < Picture1.Height + 1 Then
        Paste.Height = Paste.Height - Paste.ScaleHeight + Picture1.Height + 1
    Else
        'If Splitter tries to go off the edge then
        'move the splitter to the bottom of the form.
        If Paste.ScaleHeight < Picture1.Top + Picture1.Height Then
            Picture1.Top = Paste.ScaleHeight - Picture1.Height - 1
        End If
        Text1.Width = Paste.ScaleWidth
        Text1.Height = Picture1.Top
        Picture1.Width = Paste.ScaleWidth
        Text2.Top = Picture1.Top + Picture1.Height
        Text2.Width = Paste.ScaleWidth
        'Set the height of the pasteboard to be the area
        'below the splitter.
        Text2.Height = Paste.ScaleHeight - Picture1.Top - Picture1.Height
    End If
End Sub
```

Figure 3: To create a split bar, we enable drag-and-drop and then add code for resizing the two text-box controls.

```
Sub mOpen_Click ()
    'Menu File/Open...
    On Error Resume Next
    'File being opened must exist and hide the read-only checkbox
    CMDialog1.Flags = OFN_FILEMUSTEXIST Or OFN_HIDEREADONLY
    CMDialog1.Action = DLG_FILE_OPEN
    If Err = 0 Then
        Screen.MousePointer = HOURLGLASS
        Open CMDialog1.FileName For Binary Access Read As #1
        LoadText$ = Space$(MaxLen%)
        Get #1, , LoadText$
        Close #1
        Text2.Text = LoadText$
        Screen.MousePointer = DEFAULT
    End If
End Sub

Sub mSave_Click ()
    'Menu File/Save As...
    On Error Resume Next
    'Hide the read-only checkbox, make sure the path exists, and
    'verify when users try to overwrite a text file
    CMDialog1.Flags = OFN_HIDEREADONLY Or OFN_PATHMUSTEXIST
    CMDialog1.Flags = CMDialog1.Flags Or OFN_OVERWRITEPROMPT
    CMDialog1.Action = DLG_FILE_SAVE
    If Err = 0 Then
        Screen.MousePointer = HOURLGLASS
        Open CMDialog1.FileName For Output As #1
        'Write to file without the extra Carriage Return
        Print #1, Text2.Text;
        Close #1
        Screen.MousePointer = DEFAULT
    End If
End Sub
```

Figure 4: The menu routines for opening and saving files use an error flag to check if the user has pressed Cancel.



ing text from the pasteboard to itself.

To get a fully working text edit control with all the capabilities of Notepad (cutting, pasting, and a simple undo), all that's necessary is to set two properties. Multi-Line is set to True to allow carriage returns in the text, and ScrollBars is set to Both to facilitate easy maneuverability and keep VB from word-wrapping long lines.

The Clipboard and pasteboard text boxes look the same, but you can't edit Clipboard text. I prevent editing by setting the KeyAscii parameter in the KeyPress event to 0. This has the effect of canceling each key pressed while in this control.

THE SPLIT BAR From a programming standpoint, one of PasteBoard's most interesting features is the split bar. You drag the split bar up or down to divide the PasteBoard window between the Clipboard and the pasteboard. A split bar is a great way to display two areas on one Form while letting the user show as much as he wants of each. When there are only a few windows to manage, the split bar is simpler for the user than an MDI (Multiple Document Interface).

The split bar for PasteBoard is created by placing a narrow Picture control in the middle of the Form. The DragMode property is set to Automatic so that whenever the user drags this control, an outline of it appears under the pointer. Then the MousePointer property is set to 7 (size N S, which stands for north south). This changes the mouse pointer to an up and down arrow when the cursor is above this control. The last step is to resize the two text-box controls when the Picture control is dropped. That's all we need for a working split bar.

Figure 3 shows the three routines involved in this operation. The DragDrop event code for Text1 and Text2 simply moves the split-bar picture where you drop it and then calls the Form_Resize routine to adjust the size of the text boxes. In Text1_DragDrop, I ignore the Source parameter, since the only control that can be dropped in this program is the split bar. I also ignore the X parameter, since I don't care where the split bar is dropped horizontally. The If statement prevents the split bar from forcing a Height of 0 (an illegal value) on the Text1 text box. In Text2_DragDrop, the If statement does the same thing for the lower text box.



Since the Y value in Text2_DragDrop is the vertical position within the text box, the Top property is added to give you the position on the Form.

The subroutine Form_Resize moves and resizes all the controls. The first If statement makes sure we do this work only if the form is not minimized; otherwise, we'll be trying to fit all our controls into an area the size of an icon! The second If statement forces the Form to a certain minimum size so that we have enough room for all the controls. It does this by making the Height big enough to hold the caption and menu areas of the Form (Paste.Height - Paste.ScaleHeight) along with the split bar. The If statement within the Else keeps the split bar from falling off the bottom of the Form. The remaining lines set the positions and sizes for the three controls.

FILE I/O Visual Basic's common dialog control (CMDIALOG.VBX) calls the Windows 3.1 common dialog functions: open a file, save a file, change colors, choose fonts, print, or call WinHelp. PasteBoard uses only the Open and Save

dialog boxes.

First I set the properties in the control that will be used by both the open and the save routines. The DefaultExt property is set to "txt" so that filenames typed without an extension will default to .TXT. The Filter property, which determines the file types displayed in the List Files of Type drop-down list, is set to

```
Text Files (*.txt)|*.txt
```

The | character is used to separate the description from the actual file specification. Finally, the CancelError property is set to True so that an error is generated if the user presses the Cancel button. This allows the program to determine whether the user has picked a file or pressed Cancel.

Figure 4 shows the routines for opening and saving a text file. Both procedures have the same general structure. The On Error Resume Next statement tells Visual Basic to ignore errors and just keep running. Later, the Err function is used to check if an error occurred. In the next

line, the common dialog flags are set to customize the behavior of the dialog boxes. When a file is being opened, the flags hide the read-only check box and force the user to enter only files that exist. Then flags that are set when saving a file prompt the user before overwriting an existing file, make sure that the path exists, and hide the read-only check box.

Next, the Action property is set to call the appropriate dialog box—Open or Save. The If statement makes sure no error has occurred (remember we set CancelError to True so that VB would generate an error if the user presses the Cancel button). You'll also notice that the MousePointer is set to display an hour-glass during opening and saving.

Both routines open the file stored in the Filename property of the common dialog control. For the Open routine, binary access is used to load the whole file with one Get statement. The Get statement loads all characters from the file up to the length of the LoadText\$ variable. You'll notice the start parameter is missing in the Get statement; this tells VB to start reading the file

MOVING?

Please write to: PC Magazine, P.O. Box 54093, Boulder, CO 80322. Include your mailing label from a recent issue of PC Magazine for faster service. Please allow up to 60 days for change of address to take place.

from where it last left off. Since we just opened the file, reading starts at the first character. After the end-of-file marker is reached, the file is closed and the text is stored in the pasteboard text box.

Saving a text file is also easy. After opening the file for output, I use the Print statement to write all the text to the file at once. You'll notice that the Print statement ends with a semicolon. Unless you

add a semicolon to a Print statement, it will automatically add a carriage return to whatever you print. Since we are printing a text box that already has embedded carriage returns, we don't want to add yet another. Closing the file is all that's left to complete the save.

As this program demonstrates, utility, power, and ease of use do not require much effort when using Visual Basic.

PasteBoard is a simple program, but it's a real time-saver if you do a lot of cutting and pasting between files. □

ROBERT LAUSEVIC'S UTILITY, PASTEBOARD, WON PC MAGAZINE'S "WRITE A UTILITY. WIN A FRIDGE" CONTEST. HE IS A PROGRAMMER AT INTEL CORP. IN FOLSOM, CALIFORNIA, WHERE HE DEVELOPS DECISION-SUPPORT APPLICATIONS IN VISUAL BASIC.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

PasteBoard

PURPOSE: PasteBoard lets you cut, copy, and paste text from several sources or several areas within a file without switching back and forth. After you launch PasteBoard, no extra keyboard or mouse activity is required until you're ready to paste.

SETUP: To install PasteBoard, copy PASTE.EXE into the directory of your choice and if you don't already have VBRUN300.DLL and CMDIALOG.VBX, copy them into your Windows system directory (usually C:\WINDOWS\SYSTEM).

Then create an icon for PasteBoard in a Program Manager group. If you want access to PasteBoard at all times, add PasteBoard to your StartUp group.

REMARKS: PasteBoard works by appending the contents of the Clipboard to the pasteboard every time you cut or copy new information. The pasteboard has a limit of 30,000 characters. If this limit is exceeded, the pasteboard will store only the most recent 30,000 characters.

Instead of the .CLP files used by Windows' Clipboard, PasteBoard works with pure ASCII files. Although it does not have the Clipboard's ability to store binary data such as bitmaps, PasteBoard adds editing capability. You can edit pasteboard text, save it to a file, or load a file into the pasteboard.

PasteBoard's split bar lets you decide how to share the window between the Clipboard and pasteboard. Use the Edit menu to clear the Clipboard, clear the pasteboard, copy all of the text from the pasteboard to the Clipboard, or copy the selected text from the pasteboard to the Clipboard. The Display menu lets you show the text in PasteBoard in either the standard Windows proportional font (the Text menu option) or a fixed-width font (the Fixed Text menu option). The Help menu's How To... option walks you through your first cut-and-paste job using PasteBoard.

PC Magazine's utilities are available by modem from PC MagNet, our on-line service. PC MagNet is part of ZiffNet, a group of on-line services from Ziff-Davis Publishing Company. ZiffNet is hosted by CompuServe Information Service.

THE FIRST TIME If you've never used ZiffNet, you'll need to find the access number nearest you. Set your communications software to 7 data bits, even parity, no stop bits, and full duplex. Then dial 800-346-3247 with your modem. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the closest access number. Or dial 800-635-6225 (voice) for instructions.

HOW TO JOIN ZIFFNET Dial the local access number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, type 177000.5000. When you see the PASSWORD prompt, enter PC*MAGNET. Finally, when you see the ENTER AGREEMENT NUMBER prompt, enter PCMAG94. Current CompuServe members can type GO PCMAG at any CompuServe ! prompt. Once you enter your billing information, you'll see your personal user ID and temporary password.

MEMBERSHIP PRIVILEGES Membership costs \$2.95 per month. You receive free access to PC Magazine Editors' Choice awards, Product Reviews Index, weekly news from PC Week, Buyer's Market, ZiffNet Highlights, the Support Forum, and the current utility (type GO ZNT FREEUTIL). For other services, connect-time charges vary according to modem speed. Billing is based on 1-minute increments. You can also download all of PC Magazine's utilities and tips. Type GO ZNT TIPS.

Prodigy members can download the utilities from ZiffNet selections on Prodigy for a transfer fee of \$3 per program. Jump 'ziff select' and browse the computing topics for programs.

FREE UTILITY You can download this month's utility, free of charge, from PC Magazine's BBS by dialing 617-231-4450 with your modem. Just enter your name at the prompt and follow the menus.

NO MODEM, NO PROBLEM If you don't have a modem, you can get our utilities by mail. Just send your request with your name, address, and preferred disk size to Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251; fax, 317-856-2086.

COPYRIGHT INFORMATION The programs presented in PC Magazine can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited.

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

HARDWARE

Disk Size Redux

► **PC MAGAZINE:** In our issue of June 28, 1994, a reader asked about the discrepancy between the advertised capacity of his hard disks (245MB and 345MB) and their capacities as reported by his computer (only 234MB and 330MB). I explained that the problem was probably the difference between formatted and unformatted capacity.

Many sharp-eyed readers wrote in to offer a more precise explanation: Hard disk vendors use a different measuring stick than computers. Vendors treat *megabytes* as “millions of bytes,” so a disk with 245,000,000 bytes of formatted capacity is called a “245MB” hard disk.

Computers don’t count that way, however; binary beasts that they are, they count by powers of 2. A kilobyte is 1,024 bytes, not 1,000, and a megabyte is 1,024 kilobytes. So a megabyte to a computer is not 1,000,000 bytes, but rather 1,048,576, which is 2^{20} . Divide 245,000,000 bytes by 1,048,576 and you get 233.65—which, when rounded up, results in the 234MB capacity reported by the reader.

So the correct answer to the question is that both numbers are for the formatted capacities, and the 5 percent variation is simply caused by a difference in how *megabyte* is defined.

Jim Rogers of Vancouver, B.C., went one step further to show a third way that disk capacities are measured. He pointed out that the high-density 3.5-inch floppy disk is commonly referred to as a “1.44MB” disk. In fact, it contains 1,474,560 bytes (2 sides times 80 tracks times 18 sectors per track times 512 bytes per sector). Figuring 1,000,000 bytes per megabyte would give a capacity of 1.47MB, but 1,048,576 bytes per

megabyte yields only 1.41MB. It turns out that for floppy disks, a megabyte is defined as 1,024,000 bytes, or 1,000K (where a kilobyte is defined as 1,024 bytes, or 2^{10}). Divide the 1,474,560 by 1,024,000 and you get the familiar 1.44MB result.

As Humpty Dumpty said in *Through the Looking Glass*, “When I use a word, it means just what I choose it to mean—neither more nor less.” Obviously, the disk manufacturers have taken a page from Mr. Dumpty’s book.—*Alfred Poor*

Can't Take the Heat

❓ I have a desktop computer that’s only three years old. During the past year, it has occasionally powered down without warning. When I turn the system off and let it rest for a few minutes, it will work—but there is no telling when it will go down again. I took it to a reliable repair shop twice, but they could not determine what was wrong. Do you have any idea what could be the cause of this problem?

*Heinz Ritter
San Jose, California*

► **PC MAGAZINE:** The prime suspect is heat. Take the cover off the case and run the computer “topless” for a while. If the problem does not recur, the suspicion will be that much stronger.

There are a number of factors that could allow heat to build up in a three-year-old computer. It is possible that dust has built up on some of the components, reducing the cooling effects of air moving within the case. More likely, the bearings in the cooling fan in the power supply have become worn, and the fan is not moving as much air as it should. (Complete fan failures are not that uncommon, either, so make sure the blades are turning when you turn on the system.) A third possibility is dust buildup within the power supply itself; these components generate a fair amount of heat and if overheated might trip the system off as you describe.

The solutions include careful cleaning of the motherboard, the power supply, and all air passages. Replacing the power supply—or just the power supply fan—may help solve the problem. You can also get additional fans. There are all sorts of products available, including fans mounted on expansion cards and small fans that stick onto your CPU.

Keep in mind that overheating can cause less obvious problems. A friend of mine recently reported bizarre bugs in Microsoft Word for Windows, Version 6.0: Documents created from a custom template would spontaneously develop new page and section breaks. After lots of painstaking trouble-shooting, he took the

PC SOLUTIONS INDEX

Hardware

Disk Size Redux.....313
Can't Take the Heat.....313
Documentation Location.....316

Word Processing

Printing Different First and Second Sheets.....316

Spreadsheets

Ignore Invalid Cells with Database Functions.....317

Graphics

Taking Control of PageMaker.....329

Languages

Play WAV Files in Borland Pascal.....330



See index, page 317.

PC DIRECT starts here with exciting offers from top direct vendors.

OUR PRICES HAVE NEVER LOWER.



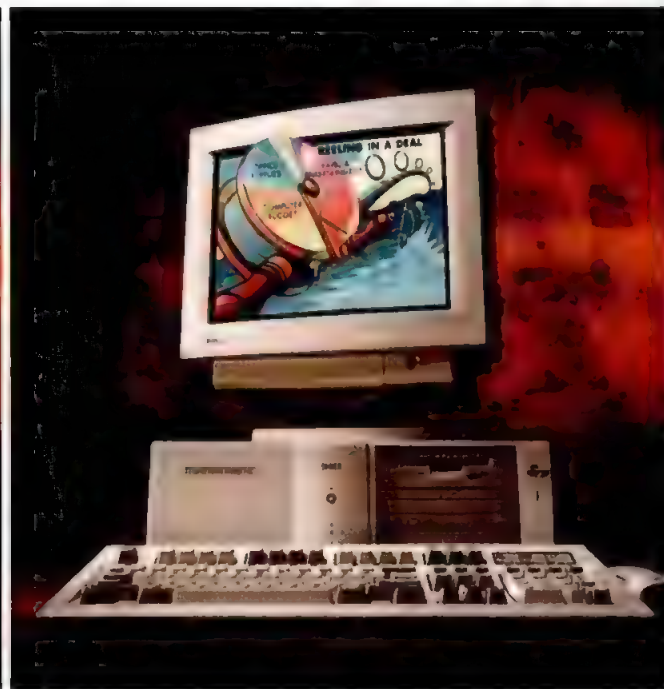
DELL DIMENSION™ XPS P60
A PENTIUM™ PROCESSOR BASED 60MHz SYSTEM

\$1999

BUSINESS LEASE[®]
\$74/MO.

ORDER CODE **#500023**

- 8MB RAM
- 340MB HARD DRIVE (13ms)
- VS15 MONITOR (15" CRT, NII)
- PCI VIDEO CARD WITH 1MB VIDEO RAM
- 256KB WRITEBACK CACHE
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MS-DOS® 6.2/MICROSOFT® WINDOWS™ 3.1/MOUSE



DELL DIMENSION XPS P90
A PENTIUM PROCESSOR BASED 90MHz SYSTEM

\$2599

BUSINESS LEASE
\$96/MO.

ORDER CODE **#500027**

- NEW MINI TOWER STYLE AVAILABLE
- 8MB RAM
- 540MB HARD DRIVE (12ms)
- ENHANCED IDE
- VS15 MONITOR (15" CRT, NII)
- PCI VIDEO CARD WITH 1MB VIDEO RAM
- 2X MULTI-SESSION CD ROM DRIVE
- 256KB WRITEBACK CACHE
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MS-DOS 6.2/MICROSOFT WINDOWS 3.1/MOUSE



[®] Denotes a cool feature which makes this system even more cool. *Prices valid in the U.S. only. Prices and specifications subject to change without notice. [®]Business leasing arranged by Leasing proprietary interest in the marks and names of others. ©1994 Dell Computer Corporation. All rights reserved.

ES BEEN

**[OUR SERVICE HAS
NEVER BEEN HIGHER.]**



DELL DIMENSION XPS P90
A PENTIUM PROCESSOR BASED 90MHz SYSTEM

\$3899 | BUSINESS LEASE
\$140/MO.

ORDER CODE #500028

- NEW MINI TOWER STYLE AVAILABLE
- 16MB RAM
- 1 GIGABYTE ENHANCED IDE HARD DRIVE (10ms)
- VS17 MONITOR (17" CRT, NI)
- 64-BIT #9 PCI 2MB VRAM VIDEO CARD

- NEC 3X CD ROM DRIVE (450KB/SEC. TRANSFER RATE)
- 256KB WRITEBACK CACHE
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MS-DOS 6.2/MICROSOFT WINDOWS 3.1/MOUSE

Lower prices, higher service. The readers of PC Magazine even chose Dell for their Service and Reliability Award. Call us. We'll show you.

DELL

To Order, Call

800-388-3355

In Canada* Call 800-668-3021

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT

Keycode #11BPG

Group, Inc. The Intel Inside and Pentium Processor logos and Pentium are trademarks of Intel Corporation. MS-DOS and Microsoft are registered trademarks and Windows is a trademark of Microsoft Corporation. Dell disclaims

cover off his system and the problems went away. Heat is truly one of the biggest enemies of semiconductor components.
—*Alfred Poor*

Documentation Location

TIP I ordered three identical computers from the same direct-channel source and got two ISA-bus motherboards and one local bus motherboard, two different types of IDE I/O cards, memory chips rated at different speeds, and other interesting variations. My problem was keeping all the different documentation straight. The solution I came up with is to take an antistatic bag and fill it with the documentation for a particular machine. The packet then fits either under the disk drive bays of a desktop case or in the base of a tower case. This technique means the documentation will always be where it is needed when it is needed.

*Jonathan E. Jaffe
Chicago, Illinois*

► **PC MAGAZINE:** This is another one of those "Now why didn't I think of that?" ideas. I hate to think of the amount of time I've wasted trying to track down the

switch settings, jumper functions, and other arcane but essential details that you need when installing new components or trouble-shooting old ones. I have a few suggestions on how to improve on the idea, however.

First, consider using a self-sealing plastic bag and taping it to the inside of the case rather than stuffing the packet under the disk drives. An alternative to the plastic bag is a Federal Express airbill pouch; it already has an adhesive surface on the back, and if you leave the paper strip on the edge, you can insert and remove the pages as needed.

HOW TO CONTACT US

Do you have a hardware, software, or systems problem you can't solve? Do you have a tip you think other readers could use? Perhaps you'd like a better understanding of how something works. If so, we invite you to tell us about it. Our experts can give you practical solutions to your problems, provide techniques for using your software and hardware more productively, and help you grasp computer concepts and understand the latest technology.

It's easy to contact us. Just send us your submission (use ASCII format for text files) via the medium that's most convenient for you:

U.S. Mail: Solutions, *PC Magazine*, One Park Ave., New York, NY 10016-5802. (Please send a floppy disk along with a printout.)

Fax: 212-503-5799.

MCI Mail: Solutions, 556-3896

CompuServe: 72241,104.

Internet: 556.3896@mcimail.com.

PC MagNet: Select Submissions to PC Magazine from the main PC MagNet menu. Upload your file to the most appropriate library. If at any time you need help, simply type a question mark (?) and hit Enter; a list of commands will be displayed. If you are not already a member of PC MagNet but would like to join, follow the instructions on page 12 to find your local access number.

CompuServe Members: If you're a CompuServe member, you can join PC MagNet by typing GO PCMAG at any CIS prompt.

For any tip we print, you'll receive \$50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

Our Advisors

Douglas Boling is a contributing editor and the author of many utilities, including MBOOT.COM and EMS40.SYS.

Frank J. Derfler, Jr. is senior networking editor and the author of the *PC Magazine Guide to Connectivity*.

Alfred Poor is a contributing editor and the author of *New Life for Old PCs*.

Jeff Prosser is a contributing editor and the author of *DOS 6 Techniques & Utilities*.

Sal Ricciardi is a contributing editor and the author of the *Running FoxPro* books from Microsoft Press.

Neil Rubenking is technical editor and author of *Can Do DOS*,

Can Do Windows, and *PC Magazine Batch File Lab Notes*.

Joe Salemi is a contributing editor and author of the *PC Magazine Guide to Client/Server Databases*.

Luisa Simone is a contributing editor and the author of the book *Microsoft Publisher*.

Craig Stinson is a contributing editor and coauthor of *Running Windows 3.1* and *Running Microsoft Excel*.

M. David Stone is a contributing editor and coauthor of *Word for Windows Companion*, Second Edition.

Ethan Winer is a contributing editor and the author of *PC Magazine BASIC Techniques and Utilities*.

I would also recommend that you include printouts of the CMOS settings for the current configuration. And you might make up an emergency boot disk that contains copies of the CONFIG.SYS and AUTOEXEC.BAT files, along with any other essential root directory files (such as drivers), so that you can quickly restore those files if they become damaged or lost.

I'm sure everyone will think of favorite items to put in this stash pouch (extra drive rails? removed mounting brackets?), but even if you put in only the few items mentioned here, you'll save a lot of time and aggravation.—*Alfred Poor*

WORD PROCESSING

Printing Different First And Second Sheets

Q I often need to merge two-page or longer letters, using preprinted letterhead for the first page and second sheets for subsequent pages. Unfortunately, my laser printer has only one tray. Does Microsoft Word for Windows offer any easy way to let me load the letterhead paper and print all the first pages, then load the second sheets and print the other pages?

*Jamie Pinsker
Miami, Florida*

► **PC MAGAZINE:** Rather than making two print runs and then collating the output, you'll generally be better off if you collate the pages before you print by interfiling the sheets in your paper tray. Assuming your paper tray feeds paper from the top, start with second-sheet paper on the bottom and alternate between preprinted letterhead and as many second sheets as you

need for each letter, ending with a sheet of letterhead on top. Each page will then print on the right kind of paper.

Although interfiling the paper may seem like a lot of work, it's no harder than collating the output after printing. More important, it offers at least one advantage—it guarantees that you'll keep consecutive pages of the same merged record together. If you collate after printing, you run a risk of mismatching pages. Be sure to square off the stack of paper, however, to minimize the possibility of paper jams. If you do get a paper jam, add or remove paper from the stack to get it back in sync with the print run.

This technique will work for any word processor and any printer that can feed cut-sheet paper. With WinWord, there's also another possibility—for most printers, at least. WinWord will let you define the paper source for the main document so you can feed the first page for each letter manually and all later pages from the paper tray. Although feeding paper manually can be a chore on long print runs, you may find that it's more convenient

than interfiling pages when you're printing relatively few letters.

The ability to define different paper sources for different pages is built into WinWord and is fully documented, so I'll only touch on it briefly here; I'll also assume the simplest case, with only one section in the document.

To set the source for the currently active document in WinWord 6.0, choose Page Setup from the File menu and then choose the Paper Source tab, where you'll find two list boxes—one for First Page and one for Other Pages. The lists will vary depending on the current printer driver but will generally include choices for some variation on Manual Feed and Default Tray. Simply set First Page to Manual Feed and Other Pages to Default Tray (or the equivalents). Make sure the Apply To box is set to Whole Document, and choose OK. When you merge the document, WinWord will automatically send commands to the printer to feed each page from the appropriate tray.

With WinWord 2.0, you can follow essentially the same procedure—except that

Page Setup is found on the Format menu rather than the File, and you choose the Paper Source button rather than the Paper Source tab. Note that on my tests with both an HP LaserJet III driver and a Canon LBP-8III driver, WinWord 2.0 proved to be less reliable than WinWord 6.0 for setting the paper source. On my tests, WinWord 6.0 always printed from the appropriate paper source. WinWord 2.0 worked correctly with the LaserJet driver, but not the Canon driver: Once the printer was set to manual feed, WinWord 2.0 didn't reset it to use the paper tray. Of course, both versions of the program depend on the driver for your printer to handle changing the paper source.—*M. David Stone*

■ SPREADSHEETS

Ignore Invalid Cells with Database Functions

TIP Lotus 1-2-3 for DOS is great for keeping students' grades. Its ability to repeat complex formulas is the best part, as it relieves teachers of hours of repetitious

SOFTWARE • PERIPHERALS • SYSTEMS • COMPONENTS • TOLL-FREE • ADVICE



**Premier Superstores
Top Direct Marketers
Manufacturers of
Systems, Software,
and Peripherals**

**If it's sold direct,
you'll find it here.**

INDEX

SYSTEMS

AMS	378
Austin Direct	367
COMPUTER DISCOUNT	
WAREHOUSE	344
Dell Computer Systems	314
Expo Tech/Vtech	370
FOSA	334
Insight Direct, Inc.	354, 418
Midwest Micro Peripherals	321
PCs Compleat	338
PerComp Microsystems, Inc.	368
Twinhead Corporation	349
USA Flex	360

SOFTWARE/PERIPHERALS/ COMPONENTS

American Small Business	375
Arlington Computer Products	357
Bulldog Computer Products	376
Computability	318

COMPUTER DISCOUNT

WAREHOUSE	344
DEE ONE SYSTEMS	379
First Source International	350
H. Co Memory Upgrades	356
Kenosha Computer Center	348
LA Trade	374
Megahaus	353
Midwest Computer Works	352
Notis Systems	336
PC Connection	331
PC Zones	342
Pinnacle Micro	335
Publishers Toolbox	337
Sunshine Computers	364
SPSS	377
TC Computers	366
Valueline	365

SOFTWARE • PERIPHERALS • SYSTEMS • COMPONENTS • TOLL-FREE • ADVICE

SPEED • SERVICE • SUPPORT • VALUE • QUALITY

SPEED • SERVICE • SUPPORT • VALUE • QUALITY

MODEMS

IMAGINATION NETWORK
5 HOURS FREE
with
the purchase of any modem!

NEW LOWER PRICES!

V.32 bis Send/Receive 14,400 for DOS or Win	
Internal / External	...\$98 / \$129
w/ Voice Int/Ext	...\$119 / \$139
Zoom 14.4 PKT / w/ Voice	...\$179 / \$265
V Fax 28.8	
Internal	...\$139
External	...\$165
Zoom 14.4 with RPI	
PC Int.	...\$89
Ext. Ext.	...\$205
14.4 PCMCIA Card	...\$195
FREE DEL.	...\$195

Supra Corporation

SupraFaxModem Internal 24/96 NEW!	...\$53
Supra 2400 External	...\$59
SupraFaxModem 144LC, Class 1 only	
Ext. DOS / Windows	...\$125
SupraFaxModem V.32 bis, Internal	...\$109
SupraFaxModem V.32 bis, Ext.	...\$172
w/ Fax Software, DOS/Win	...\$205/\$235
Supra FaxModem 288k Int/288 Ext	...\$205/\$235
Supra Express 14.4 with RPI	...\$83

Robotics

Sportster 14.4 with Fax Int / Ext	...\$115 / \$133
Sportster 28.8 Int / Ext	...\$205 / \$219
WorldPort Fax/Data 14.4 PCMCIA - FREE DEL.	...\$199
WorldPort V.32 Turbo with Fax Int / Ext	...\$329/\$349
Courier V.34 Ready SR Int / Ext	...\$375/\$419
Courier V.34 Dual Standard Int / Ext	...\$515/\$549

MOTOROLA

CELLcat 14.4 PCMCIA	...\$299
FastTalk II 1.4 kbps Int/Ext	...\$115/\$135

AT&T

14.4 Fax Modem Int/Ext	...\$149/\$165
AT&T Notebook, PCMCIA 14.4 FREE DEL.	...\$299
AT&T DataPort 20001	...\$399

VIDEO BOARDS

SHANGHAI Computer Systems, Inc.

Speedstar Pro, 1MB ISA / VLB	...\$115/\$115
Stealth 24 ISA / VLB	...\$155/\$155
Stealth Pro, SVGA ISA, 1MB / 2MB	...\$215/\$289
Stealth Pro, 1MB 1MB/2MB	...\$219/\$295
Stealth 32 VLB 2MB	...\$239
Stealth 64 2MB PCI / VLB	...\$325/\$325
Stealth 64 4MB PCI / VLB	...\$465/\$465
Viper VLB 2MB / PCI 2MB	...\$329/\$349

ATI Graphics

ATI Graphics Wonder Mach ISA or VLB	...\$119
ATI Graphics plus 2 MB	...\$195
ATI Ultra Pro 2 MB ISA or VLB	...\$259
ATI Ultra Pro EISA 2MB	...\$289
ATI Ultra Pro Turbo 2MB ISA or VLB or PCI	...\$355
Graphics Pro Turbo 4MB ISA or VLB or PCI	...\$389

Gigabyte

GXE64 PCI 1MB / 2MB	...\$175 / \$249
GXE64 VLB 1MB / 2MB	...\$175 / \$249
GXE64 Pro PCI	...\$355
90XE, 1280 x 1024 NI, SVGA:	
LVL 11, 2MB ISA / VLB	...\$349 / \$349
LVL 12, 3 MB ISA/VLB	...\$429 / \$429

Graphite

Graphite ISA 1MB HG210	...\$195
Graphite Power ISA 1MB PG310	...\$199
Graphite Power VLB 1MB PG610	...\$229
Graphite Power ISA 2MB PG420	...\$289
Graphite Power VLB 2MB PG720	...\$289
Dynastar Power 2MB ISA/VLB	...\$209
Dynastar Pro ISA 1MB/2MB	...\$155/\$195
Dynastar VL Pro SVGA 1MB / 2MB	...\$149 / \$199
Singray 1MB VLB / PCI	...\$115 / \$115
Graphite Terminator 64 VLB 1MB / 2MB	...\$365/\$485
Graphite Terminator 64 PCI 1MB / 2MB	...\$365/\$485

288MOVIE

288MOVIE 1MB / w/ sound	...\$305 / \$365
288MOVIE 2MB / w/ sound	...\$305 / \$485

MONITORS

NEC PC Multisync 4FGe

SVGA, 14" 28mm dot pitch, 1024x768 non-int.	...\$305
20", 14" 28mm dot pitch, 1024x768	...\$299
3V, 15" 28mm dot pitch, 1024x768 non-int.	...\$414

NOKIA Multisync 449E

449E, 15" 28mm dot pitch, 1024x768 non-int.	...\$549
449E, 15" 28mm dot pitch, 1024x768 non-int.	...\$599
449E, 17" 28mm dot pitch, 1024x768 non-int.	...\$655
449E, 17" 28mm dot pitch, 1280x1024	...\$1,069
449E, 21" 28mm dot pitch, 1280x1024	...\$1,959

NANO

F3401W / F3501W	...\$649 / \$655
F5501W / F5601W	...\$1,035 / \$1,295
T5801 / F7801W / T8801	...\$1,529 / \$1,979 / \$2,189

CTX

6468E, 14", 28DP, 1024x768	...\$235
1451GM, 14", 28DP, SVGA 1024x768	...\$265
1562GM, 15", 28DP, SVGA 1024x768	...\$335
1565GM, 15", 28DP, SVGA 1280x1024	...\$355
1765GM, 17", 28DP, SVGA 1280x1024	...\$689
1765GM, 17", 28DP, SVGA 1600x1280	...\$809

NETWORKING

CompuLink Starter Kits

Peer to Peer Starter Kits (Coax or TPI)	
2 User Kit Includes: 2 user of software, (2) NE 2000	
combo adapters, (2) 25' twisted pair cable, 25' coaxial	
cable, & (2) 50 Ohm terminators	
Adaptco	
Linatrac 8.0 2 user	...\$345.00
NOVELL	
Personal Network 2 user	...\$288.00
MICROSOFT	
MS Windows for Workgroups Add On 2 user	...\$295.00

Network Interface Cards

ARTISOFT	
Node Runner S12000C Coax single	...\$71.00
Node Runner S2000A Combo	...\$88.00
Node Runner S2000T 10Base-T single	...\$71.00
3COM	
Etherlink III 16 bit Combo	...\$129.00
Etherlink III 16 bit Coax	...\$115.00
Etherlink III 16 bit 10Base-T	...\$115.00
SMC	
SMC Ultra Elite 16 bit Combo	...\$119.00
SMC Ultra Elite 16 bit Coax	...\$99.00
SMC Ultra Elite 16 bit 10Base-T	...\$99.00

NATIONAL

Intomover NE2000+ Combo 16 bit	...\$87.00
Intomover NE2000+ C 16 bit Coax	...\$89.00
Intomover NE2000+ T 16 bit 10Base-T	...\$89.00
Intomover NE4100C-1 16 bit PCMCIA Coax	...\$165.00
Intomover NE4100T-1 16 bit PCMCIA 10BT	...\$165.00

Operating Systems

NOVELL	
Novell Personal Network:	
Single User / 5 User	...\$65.00 / \$255.00
Novell Network 3.12	
5 User PC or CD	...\$585.00
10 / 25 / 50 / 100 User PC or CD	...CALL
Novell Network 4.02:	
5 User CD	...\$789.00
10 / 25 / 50 / 100 User CD	...CALL
Artisoft	
Simply LANtastic: Software Only	...\$49.00
LANtastic Network Operating System 6.0:	
Single user / 5 user	...\$74.95 / \$315.00
10 / 25 / 50 / 100 user	...CALL
Comshare:	
5 / 10 User Server	...\$589 / \$1,189
25 / 50 / 100 User Server	...CALL
Microsoft	
Microsoft Windows NT:	
Server / Single License	...\$299.00 / \$265.00
20 / 100 User License	...CALL
Microsoft Win for WG 3.11 single user	...\$137.95
3.11 Add-on for Windows	...\$47.95
3.11 Add-on License - 1 User	...\$38.95

PRINTERS

FREE
CardShop
Plus with select
printers!
Call for details!

EPSON

AP-2250 / AP-3250	...\$119 / \$162
AP-3250 / with Color	...\$179/\$205
LX-300 / FX-670 / FX-1170	...\$165 / \$289 / \$355
DFX-5000+ / DFX-6000	...\$1,299 / \$2,299
LQ-570+ / LQ-1070+	...\$345 / \$359
LQ-470 / LQ-1170 / LQ-2550	...\$439 / \$589 / \$879
Stylus 400 NEW / 800+ NEW	...\$182 / \$262
Stylus Color NEW	...\$555
Acclaim Laser Printer 1100 / 1500 / 8000	...\$479 / \$573 / \$939

NEC

Slenderwriter 1097	...\$1,349
SuperScript 610	...\$469

FARGO

Printers / Pro Color	...\$685 / \$1,359
----------------------	--------------------

OKIDATA

ML320 / ML321	...\$299 / \$419
590 / 591	...\$419 / \$589
385 / 385C	...\$849 / \$1,019
810 / 830+ / 850	...\$885 / \$1,129 / \$1,229
4006 / 4106	...\$489 / \$649

QUANTITIES LIMITED!

HEWLETT-PACKARD

HP DeskJet 520 / HP DeskJet 580C	...\$289 / \$559
HP DeskJet 310, atonal outsheet feeder	...\$299 / \$359

TEXAS INSTRUMENTS

microMatic Ink Jet / microMatic Color Ink Jet	...\$205 / \$365
microWriter Basic, SPPM Laser	...\$509
microWriter PS23 SPPM with PS	...\$679
microLaser Pro 600 P623	...\$1,109

Canon

BJ200C / BJ230 Ink Jet	...\$259/\$335
BJ100 / BJ105X	...\$205 / \$239
BJC 4000 Color Laser	...\$499
BJC 600 Color Ink Jet	...\$479
LBP 430 / 880 Laser	...\$579/\$1,299

DEC

DECwriter 500 Ink Jet	...\$369
DECwriter 1100 Laser	...\$735
DECwriter 1100 Laser	...\$1,439

POWER SUPPLY

Smart 400 / 500 / 600	...\$279 / \$285 / \$309
Smart 750 / 900 / 1250	...\$379 / \$439 / \$589
Power Alert Plus Novel/Unit	...\$58 / \$105
Power Adviser DOS	...\$62

BC Series Standby UPS Systems

BC 250 / 400 / 500	...\$95 / \$149 / \$179
BC 500LAN / 600LAN	...\$189 / \$239
BC 900LAN / 1250LAN	...\$339 / \$455
OmniPower Line Interactive UPS	
OMNI 500LAN/OMNI 600LAN	...\$239/\$269

APC

200 / 280 / 400	...\$89 / \$99 / \$155
450 / 600	...\$185 / \$255
900 / 1250	...\$359 / \$489
400	...\$275
600 / 900 / 1250	...\$329 / \$469 / \$585
Power Manager	...\$67

HARD DRIVES

Seagate	
ST-3120A IDE	...\$165
ST-3145A/3243A IDE	...\$189/\$179
ST-3200A/3301A IDE	...\$189/\$215
ST-3360A/3600A IDE	...\$255/\$305
ST-3481A/3655A IDE	...\$229/\$315
ST-3360N/3550N/3600N	...\$348/\$359/\$408
FREE DELIVERY:	
ST-31200N SCSI	...\$685
ST-11900N	...\$1,475
ST-11950N/12400N	...\$1,475/\$1,280
ST-12550N	...\$1,379
ST-4165N/42100N	...\$1,089/\$1,399
ST-42400N/43400N	...\$1,889/\$2,089

Maxtor

IDE 7171A / 7273A/7290A	...\$108/\$189/\$185
IDE 7345A/7405A/7548A	...\$109/\$199/\$279
SCSI 7290S	...\$219

Quantum

170 IDE / SCSI	...\$189/\$179
LPS 270 IDE / SCSI	...\$219/\$215
540 IDE / SCSI	...\$299/\$309

MICROPOLIS

FREE DELIVERY (contiguous 48 states)	
1828 / 1836 SCSI	...\$1,369/\$2,089
2217 SCSI / 2217 IDE	...\$999/\$899
2210AV / 2217AV	...\$849/\$1,039
4110 SCSI / 4410 IDE	...\$739 / \$739

WESTERN DIGITAL

AC-1210 / 2250	...\$108/\$205
AC-2340 / 2430 / 2540 / 2700	...\$225/\$245/\$329/\$459
AC-31080 FREE DELIVERY	...\$639

CONTROLLERS

Adaptec

1522 SCSI Direction Kit: 16 Bit Standard SCSI with	
Floppy Support & Drivers	...\$135
1522 SCSI Direction PLUS Kit	...\$189
1542CF Single	...\$195
1542CF SCSI Master Kit / PLUS	...\$249/\$305
2742 Single NEW	...\$289
2742T Kit NEW	...\$349
APA 358 Plus Mini SCSI	...\$175
Mini SCSI APA-460 PCMCIA FREE DEL.	...\$289
AVA 1505 16 bit SCSI / 1515 CD only	...\$69/\$85
2940 PCI Kit	...\$289
AVA 2842A Kit	...\$255

NEW!

Fast SCSI ISA/PL	...\$119/\$129
Fast SCSI VESA Local/PL	...\$189/\$205
Fast SCSI PCMCIA	...\$195
Fast SCSI IQ-PCI	...\$319

TAPE BACK UP

COLORADO

JUMBO - Low Cost Tape Backup	
DJ20-250MB	...\$145
JUMBO TRAKKER - External Parallel Printer Port	
Tape Backup System:	
JT20 (80-250)	...\$279

SPEAKERS

AC-3 NEW!	...\$175
ACS-50 / 150	...\$72 / \$109
ACS-100 / 300	...\$99 / \$229

LOGITECH

Audio II Speakers	...\$129
-------------------	----------

YAMAHA

Yamaha Digital Speakers (YST10H)	...\$77
----------------------------------	---------

ACOUSTIC RESEARCH

AR Partner 22 Black	...\$89
AR Partner 42 Gray / 622 Gray	...\$119 / \$185
AR Partner 570 Gray	...\$245



MICROSOFT SUPER SALE!

Microsoft
Office
Professional
v4.3

LOW
\$349.95

MS Access 2.0 for Windows	294.95	MS Word 3.11 Add on License 1 user	38.95	MS Encarta '94	.89	MS Office Pro 4.3 Upd Wn CD ROM	365
MS Excel 5.0 for Windows	294.95	MS Windows 3.11	88.95	MS Multimedia Beethoven 9th Symp.	.53	MS PowerPoint 4.0 Comp & Vers Upgrade	114.95
MS Flight Simulator	43.95	MS Windows NT 3.1	294.95	MS Access 2.0 Version Upgrade	113.95	MS Project 4.0 Vers Upd Wn	129.95
MS FoxPro 2.6 for DOS or Win	88.95	MS Word 6.0 for Windows	294.95	MS Access 2.0 Competitive Upgrade	113.95	MS Visual Basic Pro 3.0 ODK Comp. Upd.	174.95
MS FoxPro 2.6 Pro Ed. for DOS or Win	414.95	MS Works 3.0 Win	84.95	MS DOS 6.22 Step Up	11.95	MS Windows 3.11 Upgrade	49.95
MS Project 4.0 for Windows	412.95	HARDWARE		MS Excel 5.0 for Win Comp & Vers Upd	113.95	MS Word 6.0 Competitive & Version Upgrade	113.95
MS Publisher 2.0 for Windows	84.95	MS Home Mouse	.30	MS Excel 5.0 for Win Version Upgrade	88.95	MS Word 6.0 Version Upgrade for DOS	113.95
MS Visual Basic Pro 3.0 w/ ODK for Win	294.95	MS Serial Mouse	.53	MS Office 4.2 Comp/Vers Upgrade	262.95		
MS Word 3.11 Add on for Win	44.95	MS Bookshelf '94 Edition	.82	MS Office 4.2 Version Upgrade CD ROM	.285		

EXCLUSIVE MULTIMEDIA BUNDLES!

CD ROM Drive & Interface Options

Chicon 535 Internal

Chicon 535 External

Mitsumi FX001D

NEC 3Xi Internal

NEC 3Xe External

NEC 4X External

Sony CDU-33A

Toshiba 3401B Internal

Toshiba 3401E External

Toshiba 4101 Internal - New!

Plexor 3028i Dbl Speed + Int.

Plexor 5028e Dbl Speed + Ext.

Plexor Quad Speed

TEAC SuperQuad 4X

FREE

CardShop
Plus CD
with any
CD ROM
Drive or
Upd Kit!
good thru
10/31/94!

Bare Drive	16 Bit CD only SCSI-2	16 Bit SCSI-2	Premium 3D SCSI-2 MV	Pro 3D MV	Sound Blaster SCSI-2	Sound Blaster SCSI-2 ASP	9 Title MPC Bundle
\$249	\$315	\$344	\$416	\$536	\$410	\$470	add \$79
\$359	\$425	\$461	\$539	\$659	\$533	\$593	add \$79
\$139 (w/ Sound Blaster 16 MCD = \$274 or 16 MCD ASP = \$308, or Ensoniq Soundcape = \$333)							
\$439	\$464	\$500	\$565	\$685	\$559	\$619	add \$79
\$439	\$498	\$534	\$619	\$739	\$613	\$673	add \$79
\$699 Quadruple Speed! Quantities Limited - Call Now!							
\$149 (w/ Sound Blaster 16 MCD = \$284 or 16 MCD ASP = \$318, or Ensoniq Soundcape = \$343)							
\$255	\$321	\$350	\$422	\$542	\$416	\$476	add \$79
\$349	\$415	\$451	\$529	\$649	\$523	\$583	add \$79
\$205	\$271	\$300	\$372	\$492	\$366	\$426	add \$79
\$259	\$325	\$354	\$426	\$546	\$413	\$480	add \$79
\$355	\$421	\$457	\$535	\$655	\$529	\$589	add \$79
\$465	\$524	\$560	\$632	\$752	\$626	\$686	add \$79
\$439 (w/ Sound Blaster 16 MCD = \$574 or 16 MCD ASP = \$623, or Ensoniq Soundcape = \$633)							

Add \$79

Special 9
Title Bundle
Includes

- Toolwork's Multimedia Encyclopedia
- Mavis Beacon Teaches Typing 3.0 MPC
- Animals MPC
- US Atlas 4.0 MPC
- World Atlas 4.0 MPC
- Ultimate Domain
- Chessmaster 4000 Turbo
- MegaRace
- Plus FREE CardShop CD!

Now you
get 2 more
titles for the
same price!

SUPER BUNDLES!



Prescriptions
for Learning
Bundle

BodyWorks 3.0
PharmAssist
Dinosaur
Museum

\$49

SIERRA
Flying Ace
Bundle

Aces Over Europe
Aces Over the Pacific
A10 Tank Killer
Red Baron

\$39

SIERRA
Role Playing
Adventure Bundle

Gabriel Knight
Kings Quest 6
Inco 2

\$39

CD-ROM BUNDLE RAMA - BUY 3 FOR \$57 OR 5 FOR \$95! at time of purchase only!

4000 Icons
500 True Type Fonts
7000 Clip Art Images
7th Guest
Animals! SanDiego Zoo
Arthur's Teacher Trouble
Audubon Birds
Beetles A Hard Day's Night
Beauty and the Beast
Beethoven's 5th

Carmen World Deluxe
CD Game Pak II
CD ROM Challenge Pack
(9 games)
Cipart Warehouse
Cookbook Heaven
Dictionary & Language
Dinosaur MM Encyclopedia
Encyclopedia of Sound
Family Doctors

Garbo
Great Cities of the World
V1 & 2
Guinness Book of Records '94
MPC
Hugo's House of Horrors
Jests and Props
Just Grandma and Me
Kings Quest 5
Kings Quest 6

Kodak Photo CD Access
Legends of Oz
Mad Dog McCre
Maniac Sports
Mano is Missing
CD Deluxe DOS
Mayo Clinic for Windows
Mega Race
Mixed up Mother Goose
Monkey Island

National Geographic Mammals
Oceans Below MPC
Peter and the Wolf
Picture Atlas of the World
Prehension
ProPhone Business
Edition DOS
Return to Zork
ROM Material
Software Vault II

Solar System
Sound Effects Library
Space & Astronomy
Space Quest 4
Space Shuttle MPC
STW Presents Star Wars
Chess MPC
Too Many Typesets
Ultimate Domain
US Atlas MM MPC

US History
US Presidents
USA Wars - Desert Storm
Wolfenstein 3D
Aliens of Gold
World Atlas MM MPC

Buy 3 for \$57
and 5 for \$95

SOUND CARDS

CREATIVE

Sound Blaster 16 Basic Value / Deluxe Value	\$90 / \$95
Sound Blaster Pro Deluxe Value	\$95
Sound Blaster 16 Multi CD	\$135
with adv. signal processing	\$160
Sound Blaster 16 SCSI 2	\$139
with adv. signal processing	\$199
Sound Blaster AWE32	\$265



MEDIA VISION

Pro Spectrum 16 Basic	\$79
Pro Audio Spectrum 16	\$99
Pro Audio Studio 16	\$119
Premium 3-D SCSI-2 / MCD	\$145 / \$145
Pro 3-D	\$265

MEDIAMAGIC

ISP-16 Audio Board / Plus Audio Board	\$79 / \$149
Telemetry 32	\$299



Wave for Windows 2.0 for
only \$39 with the purchase
of any Sound Card!

TURTLE BEACH

Audio Advantage PCMCIA Free Del	\$135
MultiSound Monterey	\$315
Mauri Waveable Synthesizer Upgrade	\$128
Wave for Windows	\$69.95
(w/ purchase of any Sound Card)	\$39
Quad Studio	\$349
Monte Carlo	\$99
Tropez	\$198

OTHER

Advanced Graves UltraSound/UltraSound Mix	129 / \$189
Adaptic Audio Machine	\$329
DSP Digispeech Portable Sound +	\$145
Interactive Sound/Change Model A/Model B	\$105 / \$185
Logitech SoundMan 16	\$79
Logitech SoundMan Wave 16	\$182
MS Sound System 2.0 with Board	\$139
Roland SCC-1	\$275
Roland SC-7 Sound Canvas Module	\$205
Roland SC-15 Sound Canvas Daughter Board	\$209
RAP-10 Roland Sound Producer	\$249
Orchid Gamewave 32 / Soundwave 32	\$145/\$219
Ensoniq SoundScape	\$179
ADS Audio Rock II 16	\$99

FREE Turtle Beach Demo
CD with any CD ROM Drive
or Sound Card!

CD ROM

CREATIVE

Game Blaster CD 16	\$365
Sound Blaster DigitalEdge 3x	\$675
Omni 3X - NEW!	\$349
Omni Drive Internal	\$199
Sound Blaster Multimedia Office - NEW!	\$519

MEDIA VISION

MV4000 Pro Drive & Internal	\$275
MV 2000 Family Deluxe	\$329
MV 3000 Super Deluxe	\$389
MV 4000 Premier Deluxe	\$499
MV 5000 Pro Deluxe with Triple Speed	\$685

TURTLE BEACH

Monterey Upgrade Kit	\$619
----------------------	-------

MEDIAMAGIC

ISP-16 Light	\$199
ISP-16 Sound System	\$295

MicroSolutions

Backpack Double Speed Parallel Port	\$315
-------------------------------------	-------

For Bare Drives See Grid!

P.O. Box 17882 Milwaukee, WI 53217

- Airborne: All credit approved orders in the 48 contiguous states, under \$500, are automatically upgraded to Airborne Express - 1 day delivery. Next day overnight express available for a small extra charge.
- One of Wisconsin's Top 10 Women Owned Businesses.
- Corporate, Government & School PCH Welcome.



- No Surcharge on Credit Cards.
- Most Orders Shipped within 48 hrs.
- Software Shipping: only \$4 per order, not per title. Hardware: 5.5% - Min. \$4.
- C.O.D. orders welcome, with only a \$6.00 charge. No Airborne C.O.D.
- We Ship Latest Version of Software Available.
- All Products Sold Carry Manufacturers' Full Warranties & Documentation.
- APO, FPO, HI, AK, Puerto Rico & Canadian orders welcome: 6% - Min. \$4. All orders outside contiguous 48 United States are shipped 1st Class Mail Insured or private carrier. 15% - Min. \$15. If delivery cost exceeds calculated amount, you'll be billed additional.
- Call for Free Catalog & Item Not Listed.

Personal & company checks may be delayed. Prices fluctuate beyond our control & may change for better or worse. We do not guarantee computer ability or version numbers. Defective returns must have a Return Authorization number. Call our 1-800-8 to obtain a Return Authorization or our return will not be accepted. Shipping & handling are non-refundable. All sales are final. All returns are subject to a restocking fee. Not responsible for typographical errors.

*Products offered with FREE DELIVERY applies only to the contiguous 48 states!

work with a pocket calculator. But what happens when the formulas in a worksheet cannot all be standardized, as when a formula must be tailored to a student's individual situation? Can a spreadsheet cope, for example, with a student who has missed a test but with good excuse?

The worksheet in Figure 1 represents a set of class marks. The subtotals in column E are calculated with a simple formula of the form `@SUM(B3..D3)`. The percentage grades in column F use formulas of the form `+E5/E$3*100`.

Chuck missed the first test. But because he had an excuse for his absence, the missed mark is not to count against him. Thus, his subtotal of 17 should be divided by 25—although everyone else's

	A	B	C	D	E	F
1						
2		Test1	Test2	Test3	Subtotal	Percent
3	NAME	10	5	20	35	100
4	-----	-----	-----	-----	-----	-----
5	Chuck		3	14	17	49
6	Diana	4	4	18	26	74
7	Elizabeth	8	3	15	26	74

Figure 1: This worksheet calculates students' course grades.

subtotal is divided by 35. The correct value for cell F5 is 68 ($17/25*100$), not 49.

Individually tailoring this kind of formula, especially if it has to be done repeatedly, is irksome and time-consuming. A self-modifying macro such as the one in Figure 2 can help. In the macro, I've assigned range names to three cells: AB1 is named `\a`, AB4 is named `CELL`, and AB7 is named `VAL`.

The first line of the macro prompts the user to input the value of the excused test—in Chuck's case, 10—and stores it as a label in AB7. The second line prompts the user for the address of the cell containing the formula to be modified and stores that cell address as a label in AB4. Line 3 issues the `GOTO` command, which is completed by the label stored in AB4. The tilde in line 5 sends the cursor to the target cell. Line 6 begins by invoking edit mode to expose the formula `+E5/E$3*100` for editing. In edit mode, the cursor is moved and a left parenthesis is inserted, followed by a minus sign, then the value of the excused test and a right parenthesis. The final tilde completes the job.

David Schreiber
Scarborough, Ontario

►PC MAGAZINE: Mr. Schreiber's problem is one faced by many who use spreadsheets for statistical tabulations: how to deal with outlying or otherwise invalid data points. The entry in cell B5, representing Chuck's first test score, should really be `@NA`. A zero or blank value suggests that Chuck may have taken the test but come up with a zero score. Unfortunately, NA values wreak havoc with all the standard statistical functions—`@SUM`, `@AVG`, and so on. If B5 contains `@NA`, then the value of `@SUM(B5..D5)` is NA regardless of what cells E5 and D5 contain.

Mr. Schreiber's macro automates the tailoring of column F's formulas, which are the ones that matter at grade time. But like the hand-tailoring approach that Mr. Schreiber wants to avoid, the macro is error-prone. What if the user enters the wrong target cell or the wrong adjustment value? Moreover, if Mr. Schreiber's administrative assistant examines this worksheet, will he or she understand what Mr. Schreiber has done?

A better solution is to avoid tailoring, whether by hand or by macro, and use a formula that automatically adjusts for one or more specified invalid data values. You can build this kind of formula using database statistical functions instead of the regular statistical functions.

The database statistical functions—`@DSUM`, `@DAVG`, and so on—work like their regular counterparts except that they operate only on those values that meet a stated criterion. To solve Mr. Schreiber's problem using database statistical functions, we'll start by making Chuck's Test1 score `@NA`. Then we'll make the criterion stipulate that the score values to be summed not be NA.

We'll use `@DSUM` twice—once for the subtotal values and once for the percent values. Fig-

AA	AB	
1	\a	{GETLABEL "Value of excused test ",VAL}~
2		{GETLABEL "Cell containing formula to be modified.",CELL}~
3		{GOTO}
4	CELL	
5		~
6		{Edit}{Left 7}{Right 3}~
7	VAL	
8		}~

Figure 2: This self-modifying 1-2-3 macro handles exceptional values.

ure 3 shows one way to lay out the worksheet, using 1-2-3 for DOS, Release 3.0 or 4.0, or any version of 1-2-3 for Windows. A slightly different setup is required in Release 2; we'll look at that in a moment.

In Figure 3, the test-score table has been transposed, so that the students' names and scores are now arranged by column. The scores for each test are arrayed along the row axis. This rearrangement is necessary because the database statistical functions are designed to operate on a traditional spreadsheet database—a table in which columns are fields and rows are records. I've given the name `DATA` to the range B2..E5, and I've put the formulas using the database statistical functions into cells B8..D9. To see how these formulas work, let's examine the ones in B8 and B9:

```
B8: @DSUM($DATA,B7,@ISNA(B3)=0)
B9: B8/@DSUM($DATA,"MaximumScores",
    @ISNA(B3)=0)
```

The `@DSUM` function requires three arguments: a database range, the column within the database range that we wish to examine, and a criterion expression or a reference to a range containing a criterion expression. The database range must include column headings as well the numbers on which the function is to operate;

	Chuck	Diana	Elizabeth	MaximumScores
Test1	NA	4	8	10
Test2	3	4	9	5
Test3	14	18	15	20
Subtotal	17	26	26	
Percent	68%	74%	74%	

Figure 3: In this worksheet for 1-2-3 for DOS, Release 3.0 or 4.0, or any version for Windows, the students' names and scores are now arranged by column.

WELCOME

BEWARE!
Only Midwest Micro
Offers The Real
3 Year Warranty

DANGER!
If You Don't Buy From
MidWest Micro
It'll Haunt You Forever...

WARNING!
Don't Be Tricked
Into Paying High Prices
Over Yourself to
An Elite From
MidWest Micro

WATCH OUT!
FOR THE NEW
ELITE 90 MHz
PENTIUM PCI SOUND BOOK

MidWest Micro's

High-Voltage Systems

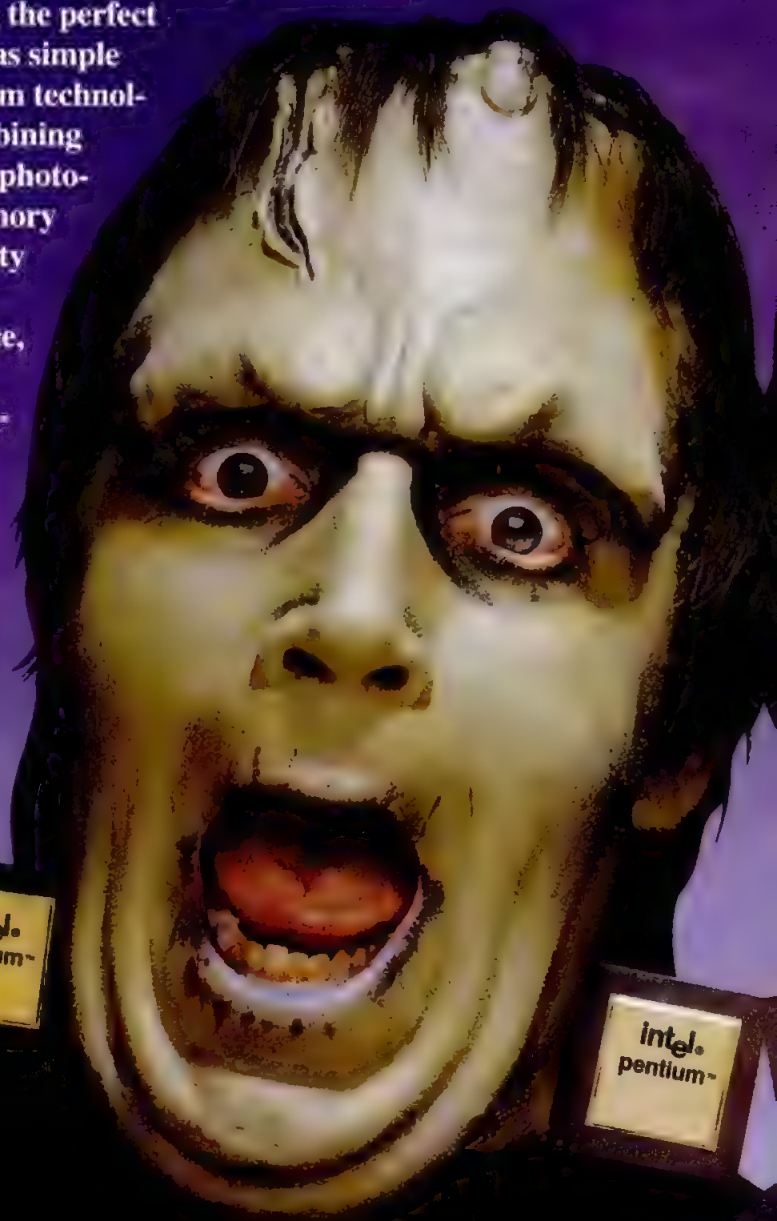
MidWest Micro packs its Elite Systems with savage elements like monstrous hard drives, roaring RAM and FREEky software. With their incredible speeds and endless expansion possibilities, you won't feel strapped down by these immortal Elites. So charge yourself up with one of MidWest Micro's Elite Systems today.

If they'd only had Pentium power, he would've turned out right—

Frankenstein's creators didn't have the advantage of Pentium technology—but

MidWest Micro does! And you can bet your tombstone we used it to create a monster machine just for you. In fact, constructing the perfect computer was simple using Pentium technology. By combining intelligence, photographic memory and the ability to do two things at once, MidWest Micro's flawless Elite Pentium Processor Based Systems came alive.

In fact, Igor says the Pentium processor is over 300 times faster than the first PC micro-processor.



Monster Machine

Mind-Blowing PCI

Stop experimenting – Elite's PCI Systems passed all the tests. With superior compatibility and high-speed data handling, it doesn't take a lab technician to figure out these systems move fast. Plus, the 32-bit data path is perfect for full-motion video and peripheral expansion. (Just think – Frankenstein could've expressed himself much better had they only added a fax modem!) Elite PCI Systems definitely spark some serious interest – order yours now.

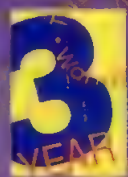
The Perfect Equation

One of MidWest Micro's most exciting creations is our line

of Elite Home PCs. Ideal for everyone, the Home PCs are bubbling over with features like a double speed CD-ROM drive, 16-bit sound card, digital quality speakers and Microsoft 3-disk CD-ROM software library. And if you're just starting out, the Elite Slimline Value Home PC has all the right parts. Its high-speed RAM, sleek case design and free software really tip the scale in your favor.

With these multimedia formulas, Elite Home PCs are sure to produce a positive reaction.

You don't have to travel all the way to Transylvania to get an Elite System. A toll-free phone call connects you directly to the MidWest Micro Castle. So flip the switch and order your Elite today.



One look at Elite's Pentium Processor Based System...and even old Frank turns green with envy.

Featuring electrifying speeds and super-scalar technology, only Pentium offers the power jolt your computing needs. And for a real charge — just eye MidWest Micro's shockingly low price!

Disclaimer: The Intel Inside Logo, Intel, Pentium and OverDrive are registered trademarks of the Intel Corporation. Seagate and the Seagate Logo are registered trademarks of Seagate Technology. The Energy Star emblem does not represent EPA endorsement of any product or service. All products are trademarks of their respective manufacturers. All registered and unregistered trademarks are the sole property of their respective companies.



Maxtor® Seagate



**MIDWEST
MICRO**

IT'S IN OUR NATURE

SYSTEMS

1-800-682-7256

PERIPHERALS

1-800-972-8822

Policy: No service charge for credit card orders. Prices are subject to change. Repair or replacement of defective products is at MidWest Micro's discretion. We are not responsible for errors in typography and photography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. Call or write MidWest Micro for more information on warranties and policies.

AD#G10

Don't Be Caught Dead Without An Elite Notebook

Whether you're at home, on the road, in the cemetery or at the office – don't be caught dead without an Elite Notebook. With three different lines to choose from, these powerful portables all feature the latest technology and absolute lowest prices.

If the thought of losing battery life on a dark stormy night makes you feel weak in the knees – don't panic. Featuring Advanced Power Management and nickel-metal hydride battery, Elite Notebooks let you compute up to 50 percent longer than silly ghouls using other notebooks.

Scared you might run out of storage space? Not a ghost of a chance. Elite Notebooks and SubNotes are available in a variety of hard drive configurations – even 720 Mb! Plus, the Elites' PCMCIA slots make adding LAN adapters, fax modems and flash memory easier than ever.

Dare to enter a new dimension of computing – open up to the Elite Pentium SoundBook, SoundBook and 486SX SubNote now.

Mismatched
Michael
PCMCIA slot
wasn't
his type

Flat
Fred
Run over
on the
information
highway

**Drained
Darryl**

The battery life
on his Elite
lasted longer
than he did

**Businessman
Bob**

Died from
watching office
management

286 System

Survived by
loving 386, 486
and Pentium
relatives



MidWest Micro's Supernatural SubNote

EVERY GHOST IN THE GRAVEYARD'S GOT ONE

No bones about it, every cool ghoul owns an Elite 486SX SubNote. This 3.9 lb. thriller is lurking with features like upgradeable RAM, a large hard drive and Advanced Power Management. In fact, the Elite's nickel-metal hydride battery lets you compute up to five hours on a single charge. (That ought to lift anyone's spirits!)

Available with a 260, 340 or 520 Mb hard drive, the 486SX SubNote also comes with a large 9.5" monochrome or dual-scan color screen. Perfect for word processing and DOS applications, the monochrome screen delivers spine-tingling display. But if black and white gives you the creeps, get the Elite with dual-scan color.

Bury yourself in the feature-filled Elite SubNote from MidWest Micro. Call us today....or else!



Elite 486SX SubNote

- ▶ Intel 486SX SL-Enhanced Processor
- ▶ 4 Mb RAM (expands to 12 Mb)
- ▶ 9.5" Mono or Dual-Scan VGA Display
- ▶ Turbo Bus Accelerated Video
- ▶ 3.5" External Disk Drive
- ▶ User Replaceable Hard Drive
- ▶ One Type II PCMCIA Slot
- ▶ Built-in Trackball
- ▶ NiMH Battery & AC Adapter
- ▶ Advanced Power Management with SMM
- ▶ One Parallel & One Serial Port
- ▶ External VGA & Keyboard Port
- ▶ MS-DOS 6.22
- ▶ Weight: 3.9 lbs.
- ▶ Carrying Case
- ▶ One Year Manufacturer's Warranty

Monochrome SubNote

486SX-33 with 260 Mb HDD \$1299
#007342

486SX-33 with 340 Mb HDD & PCMCIA 9624 S/R Fax Modem \$1499
#007307

Options

4 Mb RAM Card	#005970	\$219
8 Mb RAM Card	#005971	\$469
Car Adapter	#005972	\$ 65
PCMCIA 9624 Fax Modem	#001722	\$135
PCMCIA 14.4 Fax Modem	#001812	\$179
PCMCIA Ethernet Adapter	#001832	\$159

Dual-Scan Color SubNote

486SX-33 with 260 Mb HDD, WFW 3.11 & Lotus Organizer \$1899
#007340

486SX-33 with 340 Mb HDD, WFW 3.11 & Lotus Organizer \$1999
#007341

486SX-33 with 520 Mb HDD, 8 Mb of RAM, WFW 3.11, Lotus Organizer & PCMCIA 14.4 S/R Fax Modem \$2499
#008007



It'll Battle Your Bones

Dying for a notebook with built-in sound capabilities? MidWest Micro's Elite SoundBook is a real scream! Featuring a microphone, speakers and bundled audio software, this powerful notebook is waking the dead.

Whether you're a zombie, a human or a two-headed monster, MidWest Micro knows everyone's computing needs are different. And that's why you get to choose the processor, hard drive and screen that best suits your needs. For those of you interested in a little black magic, the monochrome screen offers drop-dead display. But if you'd like to add some orange to that black - choose the active-matrix or 10.3" dual-scan color screen.

Be the ghost with the most - order your Elite SoundBook now!



Elite SoundBook



- ▶ Intel 486, DX2 or DX4 Processor
- ▶ 4 Mb RAM (expands to 20 Mb)
- ▶ 9.5" Mono, 10.3" Dual-Scan or 9.5" Active-Matrix VGA Display
- ▶ Local Bus Video with 1 Mb Video DRAM
- ▶ Business Audio Features Including: Built-in Microphone & Speaker External Jacks for Line In & Line Out
- ▶ 3.5" Built-in Disk Drive
- ▶ User Replaceable Hard Drive
- ▶ Two Type II/One Type II PCMCIA Slot
- ▶ Built-in Trackball
- ▶ NiMH Battery & AC Adapter
- ▶ Advanced Power Management
- ▶ One Parallel & One Serial Port
- ▶ External VGA & Keyboard Port
- ▶ MS-DOS 6.22 & WFW 3.11
- ▶ Lotus Organizer
- ▶ Weight: Mono - 6.2 lbs. Color - 6.7 lbs.
- ▶ Carrying Case
- ▶ One Year Manufacturer's Warranty

Dual-Scan Color SoundBook

486SX-33 with 260 Mb HDD \$1999
#007328

DX2-50 with 340 Mb HDD \$2199
#007330

DX2-66 with 520 Mb HDD & PCMCIA 14.4 S/R Fax Modem \$2499
#008010

DX4-75 with 340 Mb HDD & 12 Mb of RAM \$2799
#008011

DX4-100 with 520 Mb HDD & 12 Mb of RAM \$2999
#008012

DX4-100 with 520 Mb HDD, 12 Mb of RAM, PCMCIA 14.4 S/R Fax Modem & PCMCIA Ethernet Adapter \$3299
#008003

DX4-100 with 700 Mb HDD, 20 Mb of RAM, PCMCIA 14.4 S/R Fax Modem & PCMCIA Ethernet Adapter \$3999
#008013

Monochrome SoundBook

486SX-33 with 260 Mb HDD \$1499
#007334

DX2-50 with 340 Mb HDD & 8 Mb of RAM \$1799
#008014

DX2-66 with 520 Mb HDD & 8 Mb of RAM \$1999
#008015

DX4-75 with 520 Mb HDD & 8 Mb of RAM \$2199
#008016

DX4-100 with 700 Mb HDD, 8 Mb of RAM & PCMCIA 14.4 S/R Fax Modem \$2499
#008021

Options

4 Mb RAM Card	#005976	\$219
8 Mb RAM Card	#005977	\$469
16 Mb RAM Card	#005978	CALL
Car Adapter	#005979	\$ 59
Mobile Max PCMCIA 105 Mb HDD	#004801	\$342
PCMCIA 9624 Fax Modem	#001722	\$135
PCMCIA 14.4 Fax Modem	#001812	\$179
PCMCIA Ethernet Adapter	#001832	\$159

Active-Matrix SoundBook

DX2-66 with 340 Mb HDD & 8 Mb of RAM \$3299
#007337

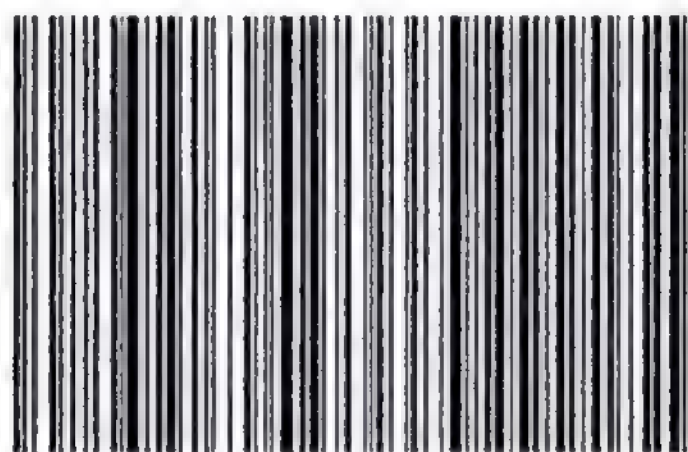
DX4-75 with 520 Mb HDD & 12 Mb of RAM \$3799
#008017

DX4-100 with 520 Mb HDD, 12 Mb of RAM & PCMCIA 14.4 S/R Fax Modem \$3999
#008018

DX4-100 with 520 Mb HDD, 20 Mb of RAM & PCMCIA 14.4 S/R Fax Modem \$4499
#008019

DX4-100 with 700 Mb HDD, 20 Mb of RAM, PCMCIA 14.4 S/R Fax Modem & PCMCIA Ethernet Adapter \$4799
#008020

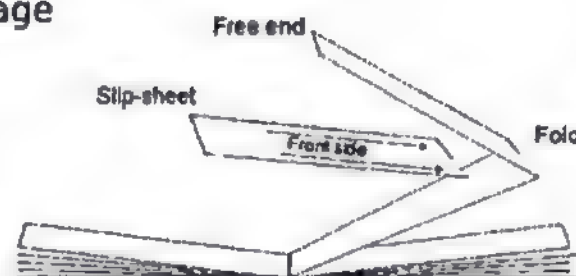
-
- Diagram illustrating the assembly of a slip sheet into a box. The slip sheet is folded and placed inside the box, with labels for 'Front side', 'Slip sheet', 'Free end', and 'Fold'.



Folded edge of the page

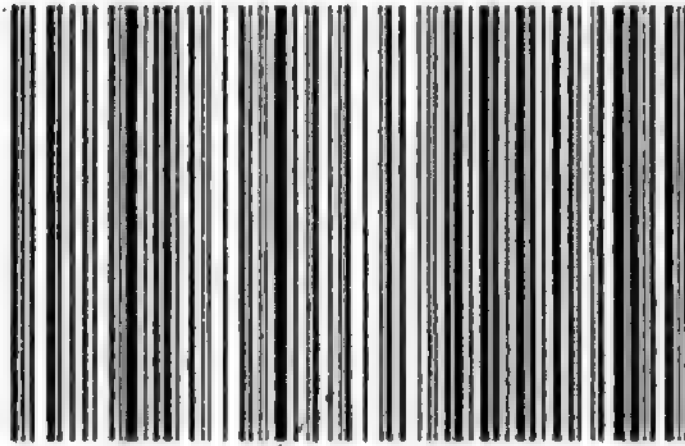
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs5lpBack-001B

Back

1. Follow instructions on the other side

Trick Or Treat, Pentium's Neat, Now It's In Our New Elite!

Here's a real treat - now you can experience the power of Pentium in the **NEW** Elite Pentium SoundBook. Even demons and vampire bats can't stand up to this monster of a notebook! With the Elite's hair-raising 90 MHz processing speed and PCI Local Bus, mobile computing takes on a whole new presence.

Cackling witches, screeching owls, wailing banshees....where are these sounds coming from? Pull the covers off your head, your house isn't haunted - it's the Elite Pentium SoundBook! Featuring a built-in microphone and stereo speakers, this 6.8 lb. hobgoblin sends chills up anyone's spine. That's right, and with bundled audio accessory software, you can record and playback the scariest music, voices and sounds.

What? You don't believe in things you can't see?

Well, one look at the Pentium SoundBook's display and you'll be shivering with excitement. Using PCI Local Bus Video, MidWest Micro's Elite delivers colorful visions on 10.3" dual-scan and 10.4" active-matrix screens. Plus, the Pentium SoundBook's mysterious high-tech Track Point Style pointing device will thrill you with total control (maybe tomb much control)!

You don't need permission from your mummy. Call MidWest Micro today and possess your own Pentium SoundBook.



Pentium Processor Based SoundBook Plus

- ▶ Intel® Pentium™ 90 MHz Processor
- ▶ 64-Bit, 256K Synchronous Burst External Cache
- ▶ 64-Bit, 8 Mb RAM (expands to 40 Mb)
- ▶ 10.3" Dual-Scan or 10.4" Active-Matrix VGA Display
- ▶ PCI Local Bus Video with 1 Mb Video DRAM
- ▶ PCI Local Bus HDD Controller
- ▶ 16-Bit Stereo Audio (Sound Blaster & Windows Sound System Compatible)

- ▶ Built-in Stereo Speakers & Microphone
- ▶ External Jacks for Line In & Line Out
- ▶ 3.5" Built-in Disk Drive
- ▶ User Replaceable Hard Drive
- ▶ Two Type II/One Type III PCMCIA Slot
- ▶ Built-in Track Point Style Pointing Device
- ▶ NiMH Battery & AC Adapter
- ▶ Advanced Power Management
- ▶ Bi-directional EPP/ECP Parallel Port
- ▶ High Speed 16550 UART Serial Port
- ▶ Infra Red Wireless "IR" Interface
- ▶ External VGA & Keyboard/Mouse Port
- ▶ MS-DOS™ 6.22 & WFW™ 3.11
- ▶ Microsoft Works for Windows™ 3.0
- ▶ Lotus Organizer™
- ▶ Weight: 6.8 lbs.
- ▶ Carrying Case
- ▶ One Year Manufacturer's Warranty

Dual-Scan Color Pentium SoundBook

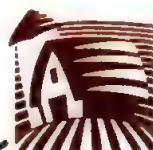
P5-90 with 520 Mb HDD #008025 **\$3799**

P5-90 with 720 Mb HDD #008026 **\$3999**

Active-Matrix Color Pentium SoundBook

P5-90 with 520 Mb HDD & 16 Mb of RAM #008027 **\$5499**

P5-90 with 720 Mb HDD & 24 Mb of RAM #008028 **\$5999**



MIDWEST MICRO

IT'S IN OUR NATURE

SYSTEMS
1-800-682-7256

PERIPHERALS
1-800-972-8822



ELITE HOME PCs

486SX-33 \$1499

- Intel® 486SX-33 Processor
- 4 Mb RAM, 128 Kb Cache
- 428 Mb IDE Hard Drive
- 32-Bit Local Bus Graphics with 1 Mb
- 32-Bit Local Bus IDE
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library - Encarta™, Works™ & Money™
- 16-Bit Stereo Sound Card
- Digital Quality Speakers
- 14.4 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 N/1 Color Monitor w/Hitachi CRT
- Slimline Case
- 4 ISA & 1 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS™ 6.22 and WFW™ 3.11
- EPA Energy Star Compliant
- The Real 3 Year Warranty

486DX2-66 \$1999

- Intel 486DX2-66 Processor
- 8 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- 32-Bit Local Bus Graphics with 1 Mb
- 32-Bit Local Bus IDE
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library - Encarta, Works & Money
- 16-Bit Stereo Sound Card
- Digital Quality Speakers
- 14.4 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- Slimline Case
- 4 ISA & 1 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- EPA Energy Star Compliant
- The Real 3 Year Warranty

P5-66 \$2499

- Intel 66 MHz Pentium™ Processor
- 8 Mb RAM, 256 Kb Cache
- 428 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library - Encarta, Works & Money
- 16-Bit Stereo Sound Card
- Altec Lansing Digital Quality Speakers
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- The Real 3 Year Warranty

P5-90 \$2599

- Intel 90 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 428 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library - Encarta, Works & Money
- 16-Bit Stereo Sound Card
- Altec Lansing Digital Quality Speakers
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- The Real 3 Year Warranty



ELITE PCI SYSTEMS

SX-33 PCI \$1199

- Intel 486SX-33 Processor
- 4 Mb RAM, 128 Kb Cache
- 428 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works for Windows 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-50 PCI \$1499

- Intel 486DX2-50 Processor
- 4 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 9624 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS™ 6.22 and WFW 3.11
- MS Works™ Multimedia Edition 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 PCI \$1799

- Intel 486DX2-66 Processor
- 8 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 14.4 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 PCI \$1999

- Intel 486DX2-66 Processor
- 8 Mb RAM, 128 Kb Cache
- 720 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- 14.4 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-50 PCI \$1299

#008636

ELITE PENTIUM PROCESSOR BASED SYSTEMS

P5-60 \$1999

- Intel 60 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 428 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

P5-66 \$2299

- Intel 66 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Middle-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

P5-90 \$2499

- Intel 90 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

P5-90 \$2999

- Intel 90 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 720 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Double Speed CD-ROM Drive
- Internal 28.8 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA.28 Digital Color Monitor w/Hitachi CRT
- 8-Bay Middle-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

P5-90 \$3499

- Intel 90 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 1 Gb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator w/ 2 Mb VRAM
- Double Speed CD-ROM Drive
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 17" 26 1600 x 1280 Exact Match Color Monitor
- 10-Bay Full-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse

- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

P5-90 \$3999

- MS-DOS 6.22 and WFW 3.11
- MS Works Multimedia Edition 3.0
- The Real 3 Year Warranty

#008645

With 2 Gb HDD



All Systems with a CD-ROM include TestDrive CD Software



Maxtor®

Seagate



MIDWEST MICRO

IT'S IN OUR NATURE

6910 U.S. Route 36 East, Fletcher, Ohio 45326

1-800-682-7256

Fax: 1-800-562-6622

Monday-Friday: 9 a.m. to 7 p.m. Saturday: 10 a.m. to 4 p.m.



For your protection we check thoroughly for stolen credit cards.

Technical Support:

1-800-262-6622

Customer Service:

1-800-728-8584

Dealers Call:

1-800-682-0522

AD#G10

	Chuck	Diana	Elizabeth	MaximumScores
Test1	NA	4	8	10
Test2	3	4	3	5
Test3	14	18	15	20

	Chuck	Diana	Elizabeth
	0	1	1

	Chuck	Diana	Elizabeth
Subtotal	17	26	26
Percent	88%	74%	74%

Figure 4: In 1-2-3, Release 2.x, the criterion argument must be a reference to an on-sheet criterion range.

that's why I included row 2 in the definition of DATA.

In B8's formula, the database argument is \$DATA—that is, an absolute reference to B2..E5. The column argument is a relative reference to B7, which contains the label "Chuck". That tells 1-2-3 that we're interested in the database numbers in the column headed Chuck. We could have used "0" here, because 0 is 1-2-3—speak for "first column." Or we could simply have hard-coded the text "Chuck" as the formula's second argument. Using a reference to B7 is the most convenient approach, because it allows us to replicate B8's formula into C8 and D8.

The formula's criterion argument is itself a formula: @ISNA(B3)=0. This tells 1-2-3 to consider only those Chuck values in which the proposition "Is it NA?" is false. Note that @ISNA's argument should be a relative reference to the first Chuck value, B3. Our database statistical function will test each value in the Chuck column against our criterion; if we had made the reference to B3 absolute using the \$ prefix, it would test the same value over and over for the rest of the test scores in the Chuck column.

B9's @DSUM formula is similar to B8's, except that the column we want to sum is the one headed by the label "MaximumScores". Here I've simply hard-coded the label into the formula, since I want the maximum scores to be the same for the other students when I copy the formula over to C9 and D9. Note that the criterion still involves the relative address of the Chuck column, however. It's his NAs we want to filter out, so the argument for

@ISNA is still B3.

You can use almost exactly the same techniques in 1-2-3, Release 2.x. The difference is that the criterion argument for your database statistical functions must be a reference to an on-sheet criterion range. Figure 4 shows how you might set this up. Cells B8..B9 are a criterion range for the @DSUM formulas in B12 and B13. Cells C8..C9 make up a criterion range for the formulas in C12 and C13, and so on. Notice that each criterion range must include

a field heading spelled exactly like the heading for one of the fields in the database.

You can use /Copy to replicate both the criterion ranges and the @DSUM formulas rightward, accommodating as many students as necessary—until you reach your worksheet's right-side boundary, column IV. In other words, you can accommodate up to 256 students with this kind of worksheet.

The need to organize students by column instead of by row may seem counterintuitive. Normally, we set up worksheets to be row-intensive rather than column-intensive. Spreadsheet programs encourage this kind of layout, giving you thousands of rows and only 256 columns. In some programs, worksheets that are wider than they are deep also waste memory. But if you can live with this inconvenience, you'll be more than compensated by the enhanced generality and security afforded by the database statistical functions.

Note, by the way, that the method described here can be used to filter out other kinds of outliers in addition to NA values. By adjusting your criteria expressions, for example, you can make your summary calculations ignore values that are negative, zero, more than two standard deviations away from the mean, or whatever. One caution: If your criteria expressions reference any cells outside the database range, make those references absolute! Otherwise, since the database statistical

function evaluates each cell in the specified database field, it will adjust the reference to the outside cell as well.

—Craig Stinson

■ GRAPHICS

Taking Control of PageMaker

❶ I use Aldus PageMaker, Version 4.0. I don't need or want most of the features in PageMaker 5.0, but I'd love to add some of the conveniences offered by the new control panel to Version 4.0. Is this possible?

Helen Dorsey
Kingston, New York

►PC MAGAZINE: There's no way to add a true control panel to PageMaker 4.0. You can, however, add a high degree of push-button automation to PageMaker 4.0 by purchasing a little utility program called PMTools from Shawangunk Graphics (914-255-5508) for \$35. PMTools, which will work with either version, places a button bar along the left side of the screen that can execute commonly used functions like Cut and Paste. The button bar

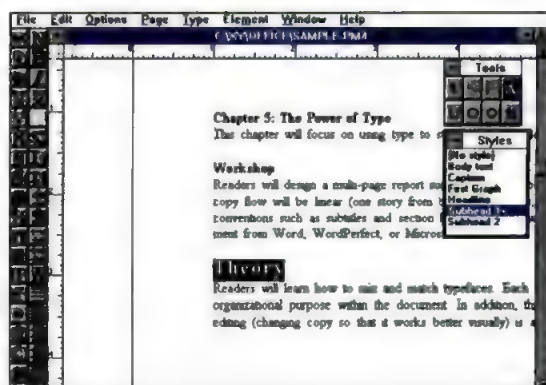


Figure 5: The PMTools button bar appears along the left side of the PageMaker screen. Here, the selected text has been reformatted with a larger point size and more leading.

displays different functions depending upon whether the text tool or the pointer tool is currently selected. When the text tool is active, for example, you can increase or decrease type size in 1-point increments, change the leading, and even kern text simply by clicking a button (see Figure 5).

The advantages are obvious: Because you don't have to wait for nested dialog

boxes to open and close, you can experiment more quickly and more freely. And you don't have to memorize a lot of keyboard shortcuts to become a power user. Instead of hunting for the correct Alt-numeric keypad combination to insert a true em dash or a copyright symbol, you can just click on a button.

But be warned: PMTools can't add new functions to PageMaker 4.0; it can only automate functions that already exist. If you want free rotation, or the ability to position objects on a page using x and y coordinates, you'll have to upgrade.

If by some chance the functions you want to streamline aren't found in PMTools, you do have another option—SmartPad from Softblox Inc. (404-892-0202). Though Softblox does make a PageMaker-specific version of SmartPad (\$79), it unfortunately only works with PageMaker 5.0. But you can buy the \$95 generic version of this utility program to create your own customized ribbon bar.
—Luisa Simone

■ LANGUAGES

Play .WAV Files in Borland Pascal

❓ I use Turbo Pascal for Windows, Version 1.5, and haven't discovered a good method to play .WAV files other than those connected to events in Control Panel. Can you tell me a good one? I have worked around the problem by creating a unit where my own program executes the SOUNDREC.EXE application. Then when I need to play a .WAV file, the unit simulates dragging and dropping the filename on SOUNDREC.

Hekki Annala
Oulu, Finland

► **PC MAGAZINE:** There are definitely better ways to play sounds—faster ones, too! Turbo Pascal for Windows 1.5 and Borland Pascal for Windows both include the unit MMSYSTEM.TPU, which gives you access to the Microsoft Windows 3.1 multimedia functions. Unfortunately, these functions aren't listed in the documentation, and even getting access to on-line help for them can be difficult. In Borland Pascal 7.0, bring up the help system, select Open from the File menu, and open MM-

```
PROGRAM SoundOff;
USES WinTypes, MMSystem, Strings;
VAR WavName : ARRAY[0..144] OF Char;
BEGIN
  StrPCopy(WavName, ParamStr(1));
  SndPlaySound(WavName, SND_ASYNC);
END.
```

Figure 6: This extremely simple program plays any .WAV file whose name is specified as a command line parameter or dropped onto it from File Manager.

SYSTEM.HLP. If you're using Turbo Pascal for Windows 1.5, you can read the MMSYSTEM.PAS file to see how the functions are called. You can play .WAV files quite easily, but if you decide to explore the multimedia extensions thoroughly, you'll probably want to purchase the Microsoft Windows SDK Multimedia Programmer's Reference. The SndPlaySound function is the simplest way to play a .WAV file. Just pass it the filename and one or more flags specifying how to play it. The flags are

- **SND_SYNC:** The function does not return until the sound ends.
- **SND_ASYNC:** The function returns immediately, while the sound keeps playing.
- **SND_NODEFAULT:** If the specified .WAV file can't be found, the function does not play the default sound.
- **SND_MEMORY:** The first parameter is actually a pointer to an image of a .WAV file in memory.
- **SND_LOOP:** This flag causes the sound to play continuously until stopped by a call to SndPlaySound with a NULL first parameter.
- **SND_NOSTOP:** If a sound is already playing, the function will not play another sound.

The SoundOff program (Figure 6) uses this function to play the .WAV file name passed as a parameter on the command line. Bring up File Manager and drag a .WAV file onto SOUNDOFF.EXE: It will be played instantly.

A more versatile but slower method for playing

sounds is the mciSendString function. (MCI stands for *media control interface*.) This function can control many different multimedia devices, including audio CDs and MIDI (Musical Instrument Digital Interface) synthesizers. You send it commands in text form—for example,

```
open chimes.wav type waveaudio
```

The program SOUNDMCI.PAS (Figure 7) plays a sound using mciSendString and also reports the message returned for each mci call. You'll notice that when you drag a file to SOUNDMCI.EXE, there's a substantial delay before the sound plays.

If your system has a MIDI sequencer attached, you can use SOUNDMCI.PAS to play .MID files, too! In fact, it will handle any file whose extension is specified in the [mci extensions] section of WIN.INI. SndPlaySound, by contrast, can only play .WAV files. For fast playback of .WAV files only, use SndPlaySound; for versatile control of *any* multimedia device, use mciSendString. You can obtain source code and executable files for both of these programs from PC MagNet's Programming Forum; look for the file SND-PAS.ZIP.—Neil J. Rubenking

```
PROGRAM SoundMCI;
USES WinTypes, MMSystem, Strings, WinCRT;
VAR WavName, MCIStr : ARRAY[0..144] OF Char;

PROCEDURE SendMCIAndReport(cmd : PChar);
VAR
  MCIReturn : ARRAY[0..144] OF Char;
  L : LongInt;
BEGIN
  WriteLn('Command : ', cmd);
  L := mciSendString(cmd, MCIReturn, 144, 0);
  mciGetErrorString(L, MCIReturn, 144);
  WriteLn('Result : ', MCIReturn);
END;

BEGIN
  StrPCopy(WavName, ParamStr(1));
  StrCopy(MCIStr, 'open ');
  StrCat(MCIStr, WavName);
  StrCat(MCIStr, ' alias noise');
  SendMCIAndReport(MCIStr);
  SendMCIAndReport('play noise');
  WriteLn('Press Enter to abort playback ...');
  ReadLn;
  SendMCIAndReport('close noise');
END.
```



Figure 7: The mciSendString function is slower for playing .WAV files than SndPlaySound, but it can control a variety of multimedia devices.



WORLD CLASS.

In Everything We Do.



The Best Since 1982.



EVERYTHING OVERNIGHT®

The latest take-off time in the industry. Orders placed by 3 a.m. ET ship for next day delivery. Total shipping charge—just \$5!



TOLL-FREE TECH SUPPORT

Our helpful support staff has helped us win numerous customer service awards—and legions of loyal customers. Questions? Just call!



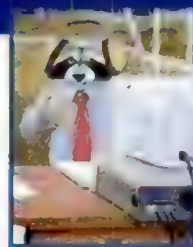
CUSTOMIZED SYSTEMS

Order a system by 10 p.m. ET and we'll customize it with selected hardware and software and still deliver it next day. No installation fee.



CORPORATE ACCOUNTS

Corporate and Government Buyers: if you buy computers, software, networking devices, or peripherals for your company...call 800-800-0014 today!



LOW PRICES BEST SERVICE

Consistent low prices in every category—more than 5000 products! And all backed by our award-winning service and support.

PC Connection®

800-800-0004

HOT!



PRACTICAL PERIPHERALS	\$359⁹⁵
4851 PC288 LCD FaxModem	
BRODERBUND	\$54⁹⁵
2333 MYST CD-ROM	
PEACHTREE	\$119⁹⁵
16088 Accounting for Windows	
CANON	\$589⁹⁵
9614 Canon BJC600 Color Bubble Jet ...	
COREL	\$269⁹⁵
11895 CorelDRAW 5.0 CD-ROM	
BORLAND	\$29⁹⁵
12207 Sidekick for Windows	

COMMUNICATIONS

6508 Dataviz Conversions + Windows	\$89.95
2006 DataStorm ProComm+ Windows	139.95
2446 Delrina WinFax Pro 4.0	84.95
2463 Farallon EtherWave Kit	259.00
11396 Hayes ACCURA 14.4 Fax	149.95
16109 Intel EtherExpress ProTP	99.95
16428 Intel SmartVideo Rec Pro	429.95
12763 MHz XJ14.4 PCMCIA Fax	219.95
14931 Microcom 28.8 DeskPorte	249.95
2322 Mustang SW QModemPro Win	69.95
11143 Ocean Isle ReachOut H/V	129.95
4744 Practical Peripherals PM144MTII	129.95
7779 ServerTech Remote On/Off	119.95
5252 SupraFaxModem 144LC	129.95
12618 US Robotics Sportster 28.8 Fax	239.95
16391 Ventana Press Internet Kit	49.95
11608 Zircum Pocket 10BASE T Adapt	269.00
15364 Zoom VFX28.8 FaxModem	179.95
13963 Zoom VFX14.4 VofaxModem	149.95

BUSINESS

8572 Adobe Photoshop Mega Bundle	\$569.95
13791 Aldus PageMaker 5.0	579.95
14734 BestWare MYOB -Windows	54.95
14735 BestWare MYOB w/Pay -Win.	109.95
14041 Borland C++ 4.0	339.95
5821 Borland ReportSmith	99.95
5252 Claris FileMaker Pro -Windows	119.95
4402 Harvard Graphics -Windows	279.95
6276 Harvard Graphics	449.95
4984 Lotus Freelance Graphics	99.95
8877 Lotus Ami Pro 3.1	56.95
6172 MS Win for Workgroups Add-on	47.95
15847 Powersoft PowerBuilder	229.95
15868 WordPerfect Works -Windows	74.95
15866 WordPerfect InfoCentral	99.95

GRAPHICS

13046 Abracadata Design Home	\$29.95
15573 Altamira Composer	529.95
8675 Altsys Fontographer -Windows	269.95
14973 AutoCad Lite -Windows	445.95
8498 CorelDRAW! 4.0 CD-ROM	459.95
2618 CorelDRAW! 3.0	98.95
13956 Kai's PowerTools -Windows	119.95
16427 Macromedia Director -Windows	899.95
6992 North Coast PhotoMorph 2 -Win	89.95
16528 Serif PagePlus 3.0	94.95
16527 Serif SuperPack	164.95
5426 Shapeware Visio 2.0 -Windows	129.95

DRIVES

4354 CMS Jumbo 250 Tape	\$179.95
10458 IOMEGA 150 (internal)	489.95
10452 IOMEGA TR Multi 150	559.95
10537 IOMEGA PC Powered 150	479.95
4492 MDS Chinon 535 CD-ROM	299.95
4494 MDS Toshiba 3401CD (internal)	349.95
13341 NEC CDR 500 Multispin 3Xi	449.95
13340 NEC CDR-600 Multispin 3Xe	489.95



MULTI-FREQUENCY ANALOG COLOR MONITOR

MAG InnoVision's DX17F ultra-high-resolution 17" monitor with microprocessor-based digital controls offers low electromagnetic field, unlimited display colors, and several user controls.

\$759
16194



ALL AT LOW DISCOUNT PRICES!

COMPUTERS

Order by 10 p.m. ET and we'll still ship
CUSTOMIZING?
overnight for \$5

NEC
SOLID,
AFFORDABLE
NOTEBOOK
PERFORMANCE



The Active Matrix Color NEC Versa V SL-Enhanced i486 DX2 processor with 250MB hard drive delivers. DoubleTime technology offers 6-10 hours of power and it's plug-and-play compatible with the Docking Station II.

15749 COMPAQ Aero 4/33-170	\$1699
7152 COMPAQ ProLinea E4/66-200W	\$1399
2949 TEXAS INSTRUMENTS TravelMate 4000 SX/25C-200 Active Matrix	\$2949
1620 TEXAS INSTRUMENTS TravelMate 4000E DX4/75C-340 Active Matrix	\$3639

WE ALSO CARRY COMPUTERS FROM IBM AND TOSHIBA.

FAST REMOTE COMPUTING

Norton Lambert's Close-Up features a new Windows interface and new, faster point-and-select file transfer. It also gives you remote printing in Windows, host transaction log, roaming dial-back, and a modem response window for 28.8 modems.

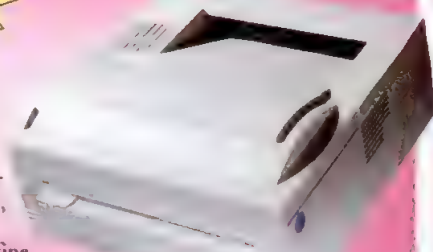


\$119⁹⁵
2754

HP LaserJet 4L
\$659⁹⁵
12212

HIGH PERFORMANCE

For smaller print jobs and personal use, the HP LaserJet 4L is the solution. It prints up to four pages per minute at 300 dpi, with its own RISC-based RET technology and microfine toner for ultimate clarity. The 100-sheet paper tray handles multiple paper sizes.



hp HEWLETT PACKARD

INPUT/OUTPUT

16455 Aqta StudioScan II	\$979.00
15187 Canon BJ7100	299.95
15857 HP DeskJet 560C	579.95
15860 HP DeskJet 520	289.95
16269 Logitech Business Mouse	55.95
13360 Martek 24 Bit Scan	749.95
16443 Okidata 6310e PS Printer	999.95
12405 Ricoh 7412 Color Scan	799.95
16481 Tinter Marc Inkjet Printer	389.95
13288 UMAX 45340 800 dpi Scan	899.95

VIDEO & SOUND

16515 A-Tech Multimedia TV Adapter	\$279.95
10000 Alter AUS3 Speaker System	179.95
3320 Creative Labs Discovery 16	329.95
16201 Matrix Graphics Accelerator	439.95
14112 Sony 17 GCMSE 17" Display	1099.00

UTILITIES

6647 Eureka Easy Screen Saver	\$29.95
11395 Control Point PC Tool Windows	89.95
9853 Eureka Easy N.B. Screen	29.95
14787 Microchip Inverter Windows	39.95
3117 Creative Data DEMM 7.0	59.95
2304 Symantec Norton Desktop Win	115.95
5136 Symantec Norton Utilities 8.5	115.95

ACCESSORIES

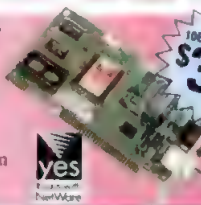
3650 American Power Back Up 400	\$169.95
1300 Farnus Universal Notebook Base	69.00

MEMORY

1411 1Mx30 30 Pin 70ns SIMM	\$54.95
8424 4Mx9 30 Pin 70ns SIMM	189.95
11672 1Mx36 72 Pin 70ns SIMM	199.95

LOW-COST ETHERNET

Reliable MDS DE-220 Network Adapter Cards with switchless configuration offer 16K on-board buffer, LED indicators, diagnostics program and Novell-certified driver.



10BASE T Board
\$39.95
11006

Combo Network Board
\$49.95
11014

yes
Network Hardware

MDS
Data Communications

AND LOOK NO FURTHER!

PC Connection was named winner of the 1994 PC World World Class Award for Best Mail-Order Company—for an unprecedented 4th time!



PC Connection

800-800-0004

OR FAX YOUR ORDER
603-446-7791

ORDERS
BY 3 A.M. ET
SHIP FOR NEXT DAY
DELIVERY.

**TOTAL SHIPPING
CHARGE
ONLY \$5**

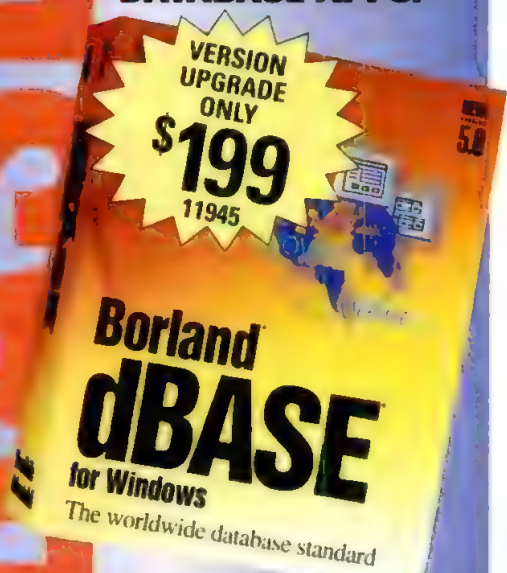
OVER 30 COLORFUL SCREEN SAVERS

After Dark for Windows includes Bad Dog, Fresh Fish, and Flying Toasters with Karaoke! Hilarious, animated Bart, Homer, Lisa, etc., do your screen in the Simpsons Screen Saver



UPGRADES	7841 MS Word 6.0 -Windows (Version)	\$119.95
	5532 MS Access 2.0 -Windows (Competitive and Version)	\$119.95
	7986 MS OfficePro 4.3 -Windows (Competitive and Version)	\$375.95
	11325 MS-DOS 6.22 Upgrade (Version)	\$47.95
	12963 WordPerfect -Windows (Competitive and Version)	\$89.95
	16320 Borland Paradox -Windows (Competitive and Version)	\$199.95

THE BEST WAY TO BUILD WINDOWS DATABASE APPS.



**VERSION
UPGRADE
ONLY**

\$199
11945

**Borland
dBASE**
for Windows

The worldwide database standard

- Total compatibility with dBASE IV and dBASE III PLUS files.
- Object-oriented development tools.
- Mouseclick accessibility to tables, queries, forms, labels, reports, and applications.
- Drag-and-drop application organization.
- Visual multi-table query creation.
- SpeedFilter technology for quickest query results.

OUR POLICY

- VISA, MASTERCARD, AMERICAN EXPRESS, and DISCOVER cards. No surcharge.
- Your credit card is not charged until we ship.
- All U.S. shipments insured; no additional charge.
- APQ/FPO orders shipped First Class Mail.
- International orders: Add 2% surcharge and \$2.30 insurance. Manufacturer support and upgrade eligibility may be limited outside the U.S.A. Some products not available for export. Call or fax for information.
- COD maximum \$1000. Cash or certified check. COD orders require an additional \$4.50 charge, ship via UPS and may require additional UPS charges.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to change without notice.
- We are not responsible for typographical errors.

SHIPPING

Continental U.S.: Total shipping charge on any order is \$5. Barring events beyond our control, all credit card orders (non-CODs) phoned in weekdays by 3 a.m. ET will ship Airborne Express for delivery the next business day. That's same day delivery for orders placed between midnight and 3 a.m. ET (Some orders ship UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday thru noon Sunday for Monday delivery. Some areas require an extra day delivery.

Hawaii, Alaska, Canada, Puerto Rico & U.S. Virgin Islands: Shipping may require additional time and charges. Please call for information.

All other areas: Please call 603-446-0004 or FAX 603-446-7711 M-F 9 a.m.-5:30 p.m. ET

HOURS

8 a.m. Monday continuous thru 5 p.m. Sunday ET



The World's Most Powerful Notebook Pentium & 486DX-100

AP 9200

486DX-4

- Intel 486 upgradeable CPU
- 2 MB VRAM (1 MB on-board)
- 1 MB system RAM
- PCMCIA type II & Type III
- Built-in Audio Chip
- Mouse Port & Joystick
- 1.44 MB Floppy Drive
- 3.5" 1.44 MB Floppy Drive
- 9.5" Mono & Active Matrix LCD, 10.3" Dual Scan LCD
- Simultaneous LCD & CRT Display
- Built-in 25mm Trackball
- NiMH Battery (46 Watts)
- Hot-Swap Battery
- Ports for 1S, 1P, Ext. Keyboard, Ext. VGA Monitor and 200 Pin Connector for Docking Station
- Microsoft DOS 6.22
- 6.6 lbs. with Battery
- 11"W x 8.66"D x 1.97"H
- Optional VL Bus Imaging Station & PCMCIA Modem

AP 3600

Pentium

- Intel Pentium™ 60/66 MHz CPU
- 2 MB VRAM (1 MB on-board)
- 1 MB system RAM
- PCMCIA type II & Type III
- Built-in Audio Chip
- Mouse Port & Joystick
- 8 MB RAM expandable to 40MB
- 3.5" 1.44 MB Floppy Drive
- 9.5" Mono & Active Matrix LCD, 10.3" Dual Scan LCD
- Simultaneous LCD & CRT Display
- Built-in 25mm Trackball
- NiMH Battery (46 Watts)
- Hot-Swap Battery
- Ports for Ext. Keyboard, Ext. VGA Monitor, & 200 Pin Connector for Docking Station
- Microsoft DOS 6.22
- 8.15lbs. with Battery
- 11.14" W x 10.31" D x 2.56" H
- Optional VL Bus Imaging Station & PCMCIA Modem



	MONO	COLOR DUAL SCAN	COLOR ACTIVE MATRIX
AP 3600/Pentium-60		\$3095	\$4095
AP 3600/Pentium-66		\$3245	\$4245
AP 9200/486DX-33	\$1575	\$2075	\$2975
AP 9200/486DX-50	\$1725	\$2255	\$3125
AP 9200/486DX-66	\$1775	\$2275	\$3175
AP 9200/486DX-100	\$2125	\$2625	\$3525



FOSA
Computer Inc.

1-800-216-3672

TEL: 908-753-6100 FAX: 908-753-6616

400 Corporate Court, #D, South Plainfield, NJ 07080

- Lifetime Toll-Free Technical Support, One Year Parts and Labor Warranty, 30-Day Money Back Guarantee
- Hours: Mon.-Fri., 8:00AM-6PM; Sat., 9AM-3PM

© FOSA Computer Inc. All rights reserved. All company and/or product names mentioned herein are trademarks and/or registered trademarks of their respective companies. Price and specification are subject to change without notice.



CIRCLE 089 ON READER SERVICE CARD

ABSOLUTE OPTICAL.

Absolutely Pinnacle. There is no doubt that optical is *the* storage solution for the future. And Pinnacle Micro is *the* optical storage leader. Our complete line of award-winning optical products will satisfy your thirst for storage. Optical is fast - Faster than most hard drives. Optical is removable - Fill up a disk... replace it with another one. Optical is reliable - No data loss. No head crashes. Even better, optical media costs as low as 15 cents per megabyte!

Now you can store unlimited amounts of data for endless applications such as graphics, imaging, networking, digital audio, digital video, server storage and data archiving. Pinnacle's wide range of optical storage solutions will increase productivity in every environment, from personal computing to the largest global network.

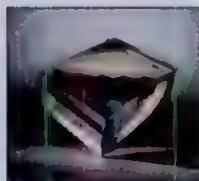
TAHOE™ 230 MB OPTICAL DRIVE



3.5" 230 Megabyte, 28 msec access, removable, portable optical storage system for both notebook and desktop computing.

SIERRA™ 1.3 GB OPTICAL DRIVE

5.25" 1.3 Gigabyte, 19 msec access optical hard drive storage system.



Provides unlimited capacity with removable media for primary storage, secondary storage, and data archival.

RECORDABLE CD (RCD) SYSTEM



Affordable, recordable CD-ROM system that allows users to create their own multimedia titles, data backup, archives and custom audio CDs.

NETWORK OPTICAL LIBRARY SYSTEMS

Storage systems ranging from 20 Gigabytes to over 1 Terabyte of high-performance centralized network storage. Also ideal for Hierarchical Storage Management (HSM) applications.



ORRAY™ 5.2 GB OPTICAL DISK SERVER

19 msec effective access, RISC based storage server that provides 4 MB/sec sustained data throughput for vertical applications such as network storage, digital audio, and digital video.



PINNACLE OPTICAL MEDIA



Removable, inexpensive, high performance optical media with up to a 30-year shelf life.

- 3.5" 128/230 MB MO media
- 5.25" 650 MB/1.3 GB MO media
- RCD 74 minute/680 MB recordable CD media

PINNACLE SERVICE & SUPPORT

As the leader in Optical storage systems, Pinnacle Micro is dedicated to providing the best service and support. Our 100% optical focus has allowed us to live up to our trademark as "The Optical Storage Company."

So the next time you are considering purchasing a hard disk or tape system, think again. Your choice is clear - Pinnacle Micro. Absolute storage. To order or for a local reseller call: 800-553-7070

PINNACLE MICRO
THE OPTICAL STORAGE COMPANY

Tel. 714-727-3300 Fax 714-789-3150

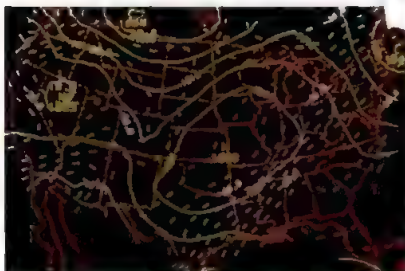
CIRCLE 098 ON READER SERVICE CARD
CIRCLE 088 ON HENDERSON/BEAUCHE CARD

ALL PINNACLE AND PSH/STC TRADEMARKS ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. THE BOTTLE DESIGN IS A REGISTERED TRADEMARK OF PSH/STC. PSH/STC AND THE PSH/STC LOGO ARE TRADEMARKS OF PSH/STC. PSH/STC HAS AUTHORIZED PSH/STC TO USE THE PSH/STC LOGO ON THE BOTTLE DESIGN. PSH/STC HAS AUTHORIZED PSH/STC TO USE THE PSH/STC LOGO ON THE BOTTLE DESIGN.

Use The Internet Like A Pro.

Navigating the Internet Just Got Easier with WinGopher

Have you wanted access to the Internet without the hassle of typing complicated addresses or memorizing file locations? Do you lose valuable time wandering through a maze of servers and unwanted files? Now you can organize and simplify your Internet access with WinGopher, a Microsoft® Windows™-based Gopher client.



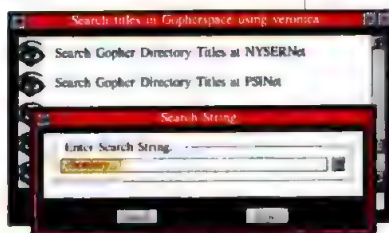
View multiple servers at one time.

WinGopher provides you with a graphical interface that uses pull-down menus and point-and-click functionality for easy Internet navigation. Using the Gopher

WinGopher Requirements for Gopher Clients Complete Package for Immediate Access

- Installation Support ✓
- Users' Guide and Online Help ✓
- Includes Text & Image Viewers & Telnet ✓
- Supports Windows Sound and Video Viewers ✓
- Supports Phone Books ✓
- Enhanced Bookmarks ✓
- Views Multiple Open Servers ✓
- Supports Winsock Compatible TCP/IP Stacks ✓
- Compatible with Other Windows Applications ✓

protocol, WinGopher supports Archie, Veronica, and WAIS searching. FTP transactions and Telnet sessions are supported, as well as any Windows sound or video viewer. An image viewer and text viewer are included with WinGopher.



Pop-up windows for searches.

Why WinGopher?

WinGopher is a fully supported product, including installation phone support, user documentation, online help, and a bulletin board service. Backed by a leading automation firm, you're not left stranded should you need assistance.

WinGopher Solutions to Meet Your Needs

Whether you need a complete package to begin accessing the Internet, or you are already connecting to the Internet, WinGopher offers you the solution to meet your needs.

WinGopher provides you with a graphical interface to the Internet. It requires: Windows TCP/IP stack software (Winsock 1.1 compatible) and connection; 386 PC or higher with Windows 3.1 and DOS 5.0; 3.5 MB disk space and 2 MB more memory. **\$69.95**

Now Available – WinGopher Complete provides you with everything you need to start accessing the Internet immediately. Included are WinGopher, a Windows TCP/IP stack software package (Winsock compatible), and an Internet connection through a leading national access provider. With WinGopher Complete, you get 30 free minutes of Internet connect time from a participating access provider. **\$129.00**

Call 1-800-55-NOTIS

FAX (708) 866-4970 • email: wingopher@notis.com

WinGopher

GRAPHICAL INTERFACE FOR THE INTERNET
CIRCLE 858 ON READER SERVICE CARD



PUBLISHER'S TOOLBOX



CALL PUBLISHER'S TOOLBOX: 1-800-756-2250 TO ORDER or ORDER BY FAX: 600-820-1112

PUBLISHING

Windows Application	
Adobe/Aldus	
NEW PRODUCT: Photoshop 3.0	549 ⁹⁵
DSP Accelerator	349 ⁹⁵
Freehand 4.0 (New!)	375 ⁹⁵
Gallery Effects Vol. 1, 2, 3	ea. 128 ⁹⁵
Pagemaker 5.0	529 ⁹⁵
Premiere	199 ⁹⁵
TypeManager 3.0	43 ⁹⁵
Corel	
CorelDRAW! 5.0 Disks/CD	569 ⁹⁵ /449 ⁹⁵
CorelDRAW! 4.0 Disks/CD	359 ⁹⁵ /255 ⁹⁵
CorelDRAW! 3.0 Disks/CD	128 ⁹⁵ /99 ⁹⁵
Upgrade 3 to 5 Disks/CD	329 ⁹⁵ /419 ⁹⁵
Upgrade 4 to 5 Disks/CD	229 ⁹⁵ /179 ⁹⁵
Corel Gallery/Corel Flow	39 ⁹⁵ /75 ⁹⁵
Corel Photo CDs	ea. 19 ⁹⁵

Publishing Standards

Andromeda Filters Series 1 & 2	ea. 79 ⁹⁵
Animation Works Interactive	289 ⁹⁵
Elastic Reality	359 ⁹⁵
NEW PRODUCT: Fractal Painter 3.0 CAL	
Macromodel/Director	689 ⁹⁵ /889 ⁹⁵
Masterclips CD/Disk	ea. 99 ⁹⁵
Multimedia Toolkit 3.0	675 ⁹⁵
PhotoMorph	89 ⁹⁵
Picture Publisher 5.0	147 ⁹⁵
Pixar Typestry	169 ⁹⁵
Presentation Task Force	89 ⁹⁵
Publisher's Task Force	49 ⁹⁵
QuarkXPress 3.3	599 ⁹⁵
Truespace	495 ⁹⁵
Visual Reality	559 ⁹⁵
Zscript/Superprint	265 ⁹⁵ /89 ⁹⁵

Publishing Utilities

Hijaak Pro 2.0	79 ⁹⁵
Image Pals 2	125 ⁹⁵
Mac-In-Dos/Plus	99 ⁹⁵ /149 ⁹⁵
TextBridge	79 ⁹⁵
Wordscan/Wordscan+ 3.0	179 ⁹⁵ /399 ⁹⁵
Winfax Pro 4.0/Network	77 ⁹⁵ /269 ⁹⁵

Typography

Adobe Type Library in stock!	CALL
Fontographer/Fontomatic	249 ⁹⁵ /39 ⁹⁵
FontMinder/Chameleon	49 ⁹⁵ /159 ⁹⁵
FontMinder/FontFont (8 Free!)	39 ⁹⁵

Microsoft

Excel 5.0/Upgrade	299 ⁹⁵ /125 ⁹⁵
Office 4.2/Upgrade	459 ⁹⁵ /275 ⁹⁵
Publisher 2.0	89 ⁹⁵
Visual Basic Pro	309 ⁹⁵
Word 6.0/Upgrade	299 ⁹⁵ /125 ⁹⁵
All Products	CALL

PRINTERS

Fargo	
Primera/Primera Pro	689 ⁹⁵ /1475 ⁹⁵
Printer Supplies	CALL
Hewlett Packard	
LaserJet 4+, 4M+, 4L, 4P, 4MP	CALL
DeskJet 560C/1200C	SPECIAL
Memory/Postscript SIMM	CALL
Lasermax	
Winjet 1200/Winprinter 1000	699 ⁹⁵ /1099 ⁹⁵
Neugen	
Imager Plus 8, 6L, 12	CALL
Design Jet Series	CALL
XLI	
Laserpix 5.0	1149 ⁹⁵

TABLETS

Accel	
Accel 5x5	119 ⁹⁵
Calcomp	
5x9/12x12 Pressure Sens.	195 ⁹⁵ /229 ⁹⁵
Summagraphics	
5x9 w/Dabbler	125 ⁹⁵
Wacom New UD Series	
High Resolution Tablets for Graphic Designers with Pressure Sensitive Pen	
4 x 6 ArtPad	149 ⁹⁵
6 x 6 ArtZ	249 ⁹⁵
12 x 12	429 ⁹⁵
12 x 18	729 ⁹⁵

GRAPHICS SOLUTIONS

► **ONLY \$599! Includes everything you need to get started!**

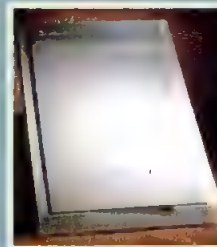
For \$599, you can own the highly acclaimed UC630 with Adobe Photoshop LE and Corel's OmniPage Direct for image editing and optical character recognition (OCR). This highly acclaimed 1200dpi 24-bit color scanner is great for scanning photos and documents for creating presentation materials, newsletters, brochures, flyers and more.



The world's best-selling page recognition software, is now more accurate, advanced, and easier to use. It now offers all the technological breakthroughs of Corel's latest generation in Optical Character Recognition (OCR). It recognizes virtually any complex document—no matter what mix of text, numbers or images—and it retains it in its original format. What's more, it even recognizes faxes. It's perfect for recognizing high volumes of information.



No matter what kind of graphics or imaging you may want to produce, Kai's Power Tools will immediately accelerate your ability to produce stunning imaging and graphics. Create a limitless range of textures and effects, stunning graphics — fast and easy. The KPT preview windows provide you with real time feedback.



The HP ScanJet IIcx flatbed scanner captures photography, monochrome and color images, halftones, line art, text in a single time-saving pass with accurate color registration! It can scan up to 1600 dpi enhanced resolution, producing a broad variety of images. Bundled with ScanJet IIcx are HP DeskScan II 2.0 and Aldus Photostyle SE image editing software for Windows. An automatic document feeder or transparency adaptor can be added.



► **Only \$1299! Includes everything you need to get started!**

The Nikon Coolscan is the first full-color, single pass scanner of its kind! Patented, solid-state illumination technology makes it exceptionally compact and quiet with low power consumption. Not only can it scan color or monochrome, positive or negative film, but it will achieve high resolution scans up to 2700 dpi, delivering sharp detail and vivid colors to all your scans! The unique combination of Coolscan's optical definition, color sensitivity and reliability make it the new standard of quality and value in desktop film scanners. Int/Ext.



► **Only \$199! Includes everything you need to get started!**

MGA Impression Plus is a low-cost solution for Windows, video playback and 3D graphics acceleration. Based on Matrox's award-winning 64-bit graphics chip, MGA Impression Plus incorporates true color acceleration 3D capabilities, DCI software video acceleration and upgradability to the VM-Channel and VideoLogic's PowerPlay64 video accelerator chip. With resolution support up to 1600 x 1200 in 256 colors, 1280 x 1024 in 16.7M colors and 120 Hz flicker-free displays at 1024 x 768, MGA Impression Plus is the all-purpose accelerator for both business and home use.

OTHER THINGS TO GET FROM PUBLISHER'S TOOLBOX

Vista, MasterCard, Discover & American Express Accepted. No Surcharge. Your credit card is not charged until the order is shipped.
Corporate purchase orders are subject to credit approval.
C.O.D. add \$5.00. Certified bank check, money order or cashier's check. \$50.00 maximum.
No sales tax (NW residents add 5.5%).
All prices subject to change without notice.
All items subject to availability.
Hardware replaced or repaired at our discretion. All software and hardware is subject to manufacturer's warranty.

We accept University & Government prices.
All returns must be in the original packaging and have a return authorization number.
A restocking fee may apply.
*Overnight: all software and light hardware up to 5 pounds add \$5.95. Add \$1.00 per pound thereafter. We ship Airborne Overnight unless UPS Ground delivers the next day.
*\$3.00 UPS Ground per order. Hardware over 15 pounds is shipped and charged at standard UPS Ground rates.
International & Canadian orders welcome!

Int'l: 1-800-756-2250 Canada: 1-800-756-2250
Germany: 1-800-756-2250 Denmark: 1-800-756-2250
Norway: 1-800-756-2250 Belgium: 1-800-756-2250
Switzerland: 1-800-756-2250 FAX: 1-800-756-2250

PUBLISHER'S

Publisher's Toolbox: 8845 S. Greenwood Dr., Suite 8, Middleton, Wisconsin 53562. Hours: Mon.-Fri. 9 A.M.-7 P.M., Sat. 9 A.M.-5 P.M., central time
©1994 Publisher's Toolbox Inc.

SCANNERS

Hewlett Packard	
ScanJet IIP/IIcx	499 ⁹⁵ /939 ⁹⁵
Accessories	CALL
Logitech	
Easy Touch	199 ⁹⁵
Microtek	
ISPI/ISPX/IIHR	775 ⁹⁵ /899 ⁹⁵ /1075 ⁹⁵
ScanMaker III (36-bit)	2499 ⁹⁵
Nikon	
ScanTouch 30-bit, 1200 dpi	1239 ⁹⁵
Tamarack	
800 dpi (While they last!)	399 ⁹⁵
Umax	
NEW PRODUCT: PowerLook	3175 ⁹⁵
UCB40/UC1260	899 ⁹⁵ /1099 ⁹⁵
Vista S6LE/S6Pro	775 ⁹⁵ /895 ⁹⁵

MONITORS

Mano	
F550/F555/550/F560/565/569/569/569/569	1299 ⁹⁵
T560/T660	1649 ⁹⁵ /2289 ⁹⁵
NEC	
5FGP/8FGP	1099 ⁹⁵ /1999 ⁹⁵
Nokia	
449E/447B/447X	515 ⁹⁵ /899 ⁹⁵ /1079 ⁹⁵
445M/445X/447L	1999 ⁹⁵ /2525 ⁹⁵ /CALL
Viewsonic	
15"/17"/21"	489 ⁹⁵ /979 ⁹⁵ /1789 ⁹⁵

MULTIMEDIA

Acorn Research	
Art Partner 570/622	289 ⁹⁵ /199 ⁹⁵
Canon	
Digital Cameras	CALL
Creative Labs	
SoundBlaster 32 AWE	265 ⁹⁵
VideoBlaster FS 200	259 ⁹⁵
Drum	
DRM 604X (6 CD Changer)	1059 ⁹⁵
Plexifier	
4Plex Int/Ext	529 ⁹⁵ /675 ⁹⁵
Tasc	
Superquad CD-Rom	479 ⁹⁵
Turtle Beach	
Multisound Monterey/Tahiti	349 ⁹⁵ /269 ⁹⁵
Wave/Mau/ WaveTable	70 ⁹⁵ /159 ⁹⁵
Yamaha	
10 Watt Speakers	75 ⁹⁵
Quad Speed Recorder	679 ⁹⁵

REMOVABLE STORAGE

Adaptec	
1542CF/2842A/2940	263 ⁹⁵ /279 ⁹⁵ /319 ⁹⁵
Fujitsu	
Dynamo 230	859 ⁹⁵
Imaging	
Bernoulli Insider 150	479 ⁹⁵
Transportable Multidisk 150	559 ⁹⁵
All cartridges	CALL
Pinnacle Micro	
Sierra 1.3 GB	289 ⁹⁵
Tahoe 230	1175 ⁹⁵
Squest	
SyDOS 88 meg Int/Ext	399 ⁹⁵ /489 ⁹⁵
SyDOS 20C meg Int/Ext	495 ⁹⁵ /569 ⁹⁵
SyDOS 27C meg Int/Ext	509 ⁹⁵ /609 ⁹⁵
SyQuest cartridges	CALL

VIDEO CARDS

ATI	
Graphics Pro Turbo*, 2/4 MB	385 ⁹⁵ /619 ⁹⁵
DIAMOND	
Stealth 64, 2/4 MB	349 ⁹⁵ /499 ⁹⁵
Stealth 32, 1/2 MB	189 ⁹⁵ /239 ⁹⁵
MATROX	
Ultima Plus, 2/2+ MB	439 ⁹⁵ /479 ⁹⁵
Impression Plus/P/220	485 ⁹⁵
Number 2	
GXE 64 Prc, 2/4 MB	349 ⁹⁵ /569 ⁹⁵
GXE 64, 1/2 MB	179 ⁹⁵ /249 ⁹⁵
1000 version: CALL	

Before You Buy

**TI
IBM
AST
NEC
COMPAQ
TOSHIBA**

Shop and Compare

Don't Settle for Less

Supplier 1	Supplier 2	Supplier 3
Guaranteed Lowest Price	YES	YES
The Best Brand Names	YES	YES
30-day Money Back Guarantee	YES	YES
Never a Restocking Fee	YES	YES
30-day Price Protection	YES	YES
PC Computing Five Star Award	YES	YES
Lifetime Toll-Free Technical Support	YES	YES
FREE Hardware Configuration	YES	YES
FREE Software Installation	YES	YES
Same Day Shipment	YES	YES
Pre-installed Software Discount	YES	YES
All Major Credit Cards Accepted	YES	YES
Never a Hidden Surcharge	YES	YES
\$4.95 Shipping on Most Peripherals	YES	YES
Compaq Authorized for Direct Marketing	YES	YES
90 Days Same As Cash	YES	YES
Low Cost Business Leases	YES	YES
Volume Purchase Agreements	YES	YES
FREE Asset Tagging	YES	YES
Customer Satisfaction Is Top Priority	YES	YES



PCs Complete is the proud recipient of PC/Computing magazine's highest Five Star rating for service and overall performance in its listing of the nation's leading direct sellers.

PCs COMPLETE
THE BEST: BRANDS • PRICE • DELIVERY • SERVICE

Open 24 Hours
Monday - Friday 9 AM - 6 PM
Saturday 10 AM - 5 PM
Sunday 11 AM - 4 PM

CALL TODAY!

800-598-4727

International (508) 624-6400

NEC: Versatility

Ask about the New
XE and XP
monitor series!

UltraLite Versa V

- ▲ 486DX2/50
- ▲ 4MB expandable to 20MB
- ▲ 2 Type II PCMCIA slots
- ▲ MS-DOS 6.2, Windows 3.1, built-in trackball
- ▲ Removable hard drive
- ▲ Removable floppy - add second battery

Screen	Hard Drive	Price
9.5" Active	250MB	\$2839
9.5" Active	250MB	\$3619
9.5" Active	340MB	\$3799
9.5" Active	540MB	\$4279

Lease for \$104/mo.

as low as
\$2839



Versa V

UltraLite Versa S

- ▲ 486 processor
- ▲ 9.5" screen
- ▲ SurePoint integrated pointing device
- ▲ 2 Type II PCMCIA slots
- ▲ Only 4.2lbs. (mono)

Processor	Screen	Hard Drive	Price
486SX/33	9.5" M	210MB	\$1889
486SX/33	9.5" D/S	210MB	\$2319
486SX/33	9.5" Act.	210MB	\$3219
486DX2/50	9.5" Act.	260MB	\$3689

Lease for \$69/mo.

Ready Multimedia Desktops

- ▲ 486 processor
- ▲ VESA local bus graphics
- ▲ NEC CD-ROM drive
- ▲ SoundBlaster 16 sound card
- ▲ Speakers, microphone
- ▲ 24/96 fax modem
- ▲ MS-DOS, Windows, Quicken
- ▲ CD titles: Compton's Encyclopedia, PFS Window Works

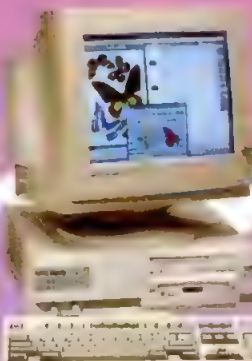
Processor	Hard Drive	Price*
486SX/33 desktop	270MB	\$1349
486DX2/66 desktop	340MB	\$1539
486DX2/66 minitower	420MB	\$1639

* NEC monitors start at \$339.99

Lease for \$50/mo



NEC



Actual Product Not Pictured

Hewlett Packard Power

LaserJet 4L

- ▲ 4PPM
- ▲ Crisp, 300dpi print-quality
- ▲ 1-year warranty

LaserJet 4L \$609.99*

*Price includes \$50 rebate through 12/31/94



LaserJet 4L

LaserJet 4P

- ▲ Sharp, 600dpi print-quality
- ▲ 2MB RAM w/Memory Enhancement Technology
- ▲ 1-year warranty

LaserJet 4P \$959.99

DeskJet/DeskWriter 540

- ▲ Sharp, 600 x 300 dpi "laser-like" print quality with RET
- ▲ 15% faster printing with 512kb RAM
- ▲ 3-Year warranty

DeskJet 540 \$289.99
DeskWriter 540 \$289.99

DeskJet/DeskWriter 320

- ▲ 600 x 300 dpi with RET
- ▲ High quality 3PPM printing
- ▲ 1-Year warranty

DeskJet 320 \$299.99
DeskWriter 320 \$299.99



DeskJet 320

DeskJet/DeskWriter 560C

- ▲ Color 600 x 300 dpi "laser-like" print quality
- ▲ Resolution Enhancement Technology for smooth, crisp text and graphics
- ▲ 3-Year warranty

DeskJet 560C \$569.99
DeskWriter 560C \$569.99



**HEWLETT
PACKARD**

Authorized Dealer

LaserJet 4MP

- ▲ True 600dpi resolution
- ▲ Auto switching between Mac and PC environments
- ▲ 1-year warranty

LaserJet 4MP \$1379.99

DeskJet 1200C/PS

- ▲ 45 scalable fonts w/Adobe Postscript Level 2
- ▲ 4MB memory expandable to 20MB
- ▲ 1-year warranty

DeskJet 1200C/PS Call for pricing

DeskJet 1200C

- ▲ Sharp, 600x300 "laser-like" print-quality with ColorSmart
- ▲ 2MB memory expandable to 26MB
- ▲ 180 sheet paper tray
- ▲ 1-year warranty

DeskJet 1200C Call for pricing

© PCs Complete. All prices subject to change and do not include shipping. Monitors sold separately. Lease prices reflect 36 month operating lease to approved business customers. All products or brand names are trademarks of their respective companies. PCs Complete, 34 St. Martin Drive, Marlborough, MA 01752. Phone (508) 480-8500. M is responsible for typographical errors.

Toshiba Direct

Portégé T3400

- ▲ Ultra-portability at only 4.4lbs
- ▲ 4MB RAM, expandable to 20MB
- ▲ PCMCIA Type II slot
- ▲ Bright active matrix color display
- ▲ External 3.5" disk drive
- ▲ Integrated AccuPoint pointing device

Model	Processor	Screen	Hard Drive	Price
TT3400CT	486SX33	7.8" Active	250MB	\$2899
TT3699CT	486DX2/50	8.4" Active	250MB	\$4069

Lease for \$106/mo.

T4700 and T4800

- ▲ 8MB RAM, expandable to 24MB
- ▲ Brilliant 9.5" color display with local bus video
- ▲ 2 PCMCIA slots (Type II, Type III)
- ▲ Microsoft Sound System, built-in microphone, audio out port
- ▲ MS-DOS, UltraFont, Indeo video compression software, Windows for Workgroups 3.11

Model	Processor	Screen	Hard Drive	Price
T4700	486DX2/50	9.5" Active	200MB	\$4549
T4700	486DX2/50	9.5" Active	320MB	\$4899
T4800	486DX4/75	9.5" Active	500MB	\$5599

Lease for \$168/mo.

T2400

- ▲ 486DX2/50 processor
- ▲ 2 PCMCIA slots (Type II, Type III)
- ▲ Integrated AccuPoint pointing device
- ▲ Optional sound card
- ▲ MS-DOS, Windows for Workgroups

Screen	Hard Drive	Price
9.5" Dual Scan	250MB	\$2929
9.5" Dual Scan	320MB	\$3089
8.4" Active Color	250MB	\$3639
8.4" Active Color	320MB	\$3799

Lease for \$107/mo.

HOT
PRODUCT



T2400



as low as
\$2929

TOSHIBA

Satellite Notebooks

- ▲ 4MB RAM, expandable to 20MB
- ▲ 9.5" display
- ▲ Type III PCMCIA slot
- ▲ 82-key keyboard
- ▲ MS-DOS, Windows 3.1
- ▲ Ballpoint mouse with Quickport
- Enhanced power management

Model	Processor	Screen	Hard Drive	Price
T1910	486SX/33	9.5" Mono	200MB	\$1499
T1910	486SX/33	9.5" Dual scan	200MB	\$2039
T1960	486DX2/50	9.5" Dual scan	200MB	\$2379
T1960	486DX2/50	9.5" Dual scan	320MB	\$2629
T1960	486DX2/50	8.4" Active color	200MB	\$3029
T1960	486DX2/50	8.4" Active color	320MB	\$3259

Lease for \$55/mo



T4700

as low as
\$4549



T1910

as low as
\$1499

XJACK 14.4/14.4 MODEM

Megahertz

\$219.99

Model	Description	Price
XXJ1144	14.4/14.4 XJACK	\$219.99
XXCC3144	14.4/14.4 PCMCIA	\$219.99
XXJ2144	14.4/14.4 XJACK GOLD	\$249.99
XXCC4144	14.4/14.4 PCMCIA GOLD	\$249.99

Call about our new 28.8 modems!

Megahertz

Purchase any Megahertz modem and get WinFax PRO 4.0 for only \$59.99.

Epson

Stylus Color, 240CPS, 720dpi with special paper \$599.99
Stylus 800, 180cps, 360dpi, 100 Sheets \$269.99
ActionLaser 1500, 6PPM, 300dpi \$619.99
ActionLaser 1600, 6PPM, 600dpi \$999.99

Magnavox

14" SVGA, 1024x768ni, 28mm \$279.99
15" SVGA, 1280x1024ni, 28mm \$379.99

Philips

15" SVGA, 1024 x 768ni, 28mm \$479.99
17" SVGA, 1600 x 1280ni, .27mm \$979.99

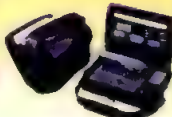
Motorola
CELLECT 14.4
PCMCIA or Pocket
cellular modems

\$329.99



Luxurious Leather

\$99.99



Premier Leather

\$139.99

Additional styles and colors available

TARGUS
A TRADITION OF EXCELLENCE

Lifetime
Replacement
Warranty

Artisoft

LANtastic V6.0- Starter Kit	\$229.99
LANtastic V6.0- 1 User	\$79.99
LANtastic V6.0- 5 User	\$329.99
Simply LANtastic Starter Kit	\$169.99
Simply LANtastic software	\$49.99

Ask about the complete line of Eagle adapters.

Maxtor

105MB PCMCIA Drive, Type III	\$309.99
131MB PCMCIA Drive, Type III	\$339.99
345MB IDE Drive	\$199.99
546MB IDE Drive	\$299.99

Smart Modular
SMART ST1414L
14.4/14.4
fax modem
with Voice Mail!

\$149.99



Texas Instruments

CD-ROM Docking System

Transform your TravelMate 4000M into the Ultimate Mobile Multimedia System with the Portable CD-ROM docking system.

- ▲ Double-speed CD-ROM drive
- ▲ 250ms access time
- ▲ Built-in speakers
- ▲ SCSI II connector

\$81999

TravelMate 4000M

- ▲ Brilliant color display
- ▲ 16-bit sound card
- ▲ Integrated Pointing device
- ▲ PCMCIA Type III slot

Processor	Screen	Hard Drive	Price
486SX2/50	9.5" Dual Scan	200MB	\$2759
486SX2/50	8.4" Active	340MB	\$3349
486DX4/75	9.5" Dual Scan	455MB	\$4439
486DX4/75	8.4" Active	340MB	\$4889

TravelMate Intelligent Docking System

- ▲ 6 16-bit ISA slots
- ▲ 2 PCMCIA Type III slots
- ▲ 2 3.5" and 2 5.25" drive bays
- ▲ Auto Load/Eject feature

\$79999

TravelMate 4000E Color

Processor	Screen	Price
486SX/25	8.2" Enhanced Color	\$1699
486DX2/40	8.2" Enhanced Color	\$2069
486DX2/50	9.4" Dual Scan	\$2319
486DX2/50	8.4" Active Matrix	\$2819
486DX4/75	8.4" Active Matrix	\$3549
486DX4/75	9.5" Active Matrix	\$4489



as low as
\$2759

TM 4000M

TEXAS INSTRUMENTS

AST Value

Ascentia 800N

- ▲ 486SX/33 or DX2/50 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 9.5" Dual scan color display
- ▲ PCMCIA Type III slot

Model	Hard Drive	Price
4/33s Model 253W	250MB	\$2299
4/33s Model 343W	340MB	\$2499
4/50d Model 253W	250MB	\$2599
4/50d Model 343W	340MB	\$2739

Lease for \$84/mo.

Bravo LC Desktops

New Generation!

- ▲ 4/8MB RAM exp. to 64MB
- ▲ VESA local bus graphics
- ▲ 1MB video RAM
- ▲ MS-DOS 6.2, Windows 3.1
- ▲ Energy Star Compliant

Model	RAM	Hard Drive	Price
4/33s Model 173W	4MB	170MB	\$1099
4/33s Model 273W	8MB	270MB	\$1369
4/50s Model 173W	4MB	170MB	\$1199
4/50s Model 273W	8MB	270MB	\$1439
4/66d Model 273W	8MB	270MB	\$1699
4/66d Model 543W	8MB	540MB	\$1829
4/100t Model 273W	8MB	270MB	\$2149
4/100t Model 543W	8MB	540MB	\$2189

Lease for \$50/mo.

AST color monitors start at \$369.99

Ascentia 900N

- ▲ 486DX2/50 or 486DX4/75 processor
- ▲ 4MB/8MB RAM exp. to 32MB
- ▲ Large dual scan or Active color display
- ▲ PCMCIA type III slot

Model	Screen	Hard Drive	Price
4/50 Model 343W	10.3" Dual scan	340MB	\$3329
4/50 Model 343W	9.5" Active	340MB	\$4629
4/75 Model 343W	10.3" Dual scan	340MB	\$3969
4/75 Model 513W	10.4" Active	510MB	\$5799

Lease for \$83/mo.



Ascentia 900

AST
Authorized Systems
Reseller

AST, AST logo are trademarks of AST Research, Inc. All rights reserved.

Ask about the new
Ascentia 500s!

Zenith Data Systems

Z-PLAYER

A complete portable multimedia solution for any PCMCIA notebook!

- ▲ Integrated double-speed CD-ROM drive, 16-bit stereo sound, speakers & audio in/out ports
- ▲ PCMCIA Type II interface included
- ▲ Upgrade any notebook with PCMCIA to a full multimedia machine in one easy step



\$49999

Z-NOTEFLEX Multimedia Notebook

Modular architecture for a multitude of user-upgradable features.

- ▲ User upgradable processor, memory, hard drive, display and more
- ▲ 4 or 8MB RAM expandable to 24MB
- ▲ 32-bit VL local bus video
- ▲ Detachable video display
- ▲ Built-in 16-bit stereo sound with speaker and microphone
- ▲ Integrated trackball
- ▲ Two Type II or one Type III PCMCIA slot
- ▲ MS-DOS Windows for Workgroups, Microsoft Sound System
- ▲ 3-Year Warranty

Processor	RAM	Screen	Hard Drive	Price
486DX2/50	4MB	10.3" dual scan	200MB	\$2869
486DX2/50	4MB	10.3" dual scan	340MB	\$3149
486DX2/50	4MB	9.5" active	340MB	\$4339
486DX2/50	8MB	9.5" active	450MB	\$4759
486DX4/75	8MB	9.5" active	520MB	\$5339

as low as
\$2869



Z-STAR EX

High-end features at a low-end price!

- ▲ Cyrix 486DX2/50 processor
- ▲ 4 or 8MB RAM expandable to 20MB
- ▲ Modular design with removable hard drive & floppy drive
- ▲ 32-bit VESA local bus graphics, 512KB video RAM
- ▲ Two Type II or one Type III PCMCIA slot
- ▲ Modem/audio module available
- ▲ Enhanced J-Mouse pointing device
- ▲ Built-in AC adapter
- ▲ MS DOS, Windows 3.1 and CoSession Host software
- ▲ 1 Year Z-CARE on-site service

Processor	RAM	Screen	Hard Drive	Price
486DX2/50	4MB	9.5" mono	200MB	\$1699
486DX2/50	4MB	9.5" dual scan	200MB	\$2179
486DX2/50	8MB	9.5" dual scan	340MB	\$2549
486DX2/50	4MB	9.5" active	340MB	\$3309

as low as
\$1699



PCs COMPLEAT
THE BEST: BRANDS • PRICE • DELIVERY • SERVICE
Open 24 Hours
Weekdays
Weekends & Holidays
8 A.M. to 8 P.M. EST

CALL TODAY!

800-578-4727

International (508) 624-6400

Z-NOTEFLEX ACCESSORIES

FLEXDOCK port replicator	\$219.99
FLEXBAY floppy bay/battery recharger	\$159.99
FLEXSHOW Multimedia Companion	\$799.99
FLEXSITE LCD Display Stand	\$199.99

IBM® • IBM® • IBM®

ValuePoint® Performance

Go beyond the very edge of industry standards with the new ValuePoint Performance Series, featuring:

- ▲ 486DX/33, DX2/66, Pentium upgradable
- ▲ 4/8MB RAM exp. to 128MB
- ▲ 64-bit VESA Local Bus Graphics
- ▲ SelectaBus VESA or PCI Bus technology (interchangeable)
- ▲ Support for up to 4 IDE devices
- ▲ IBM DOS 6.3, MS Windows 3.11
- ▲ 3-Year Warranty

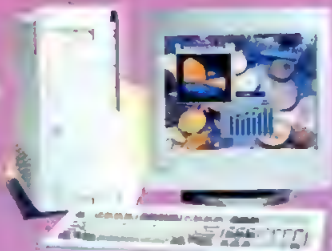
Processor	Hard Drive	Slots/Bays	Price
486DX/33	270MB	3/3	\$1489
486DX/33	364MB	3/3	\$1749
486DX/33	364MB	5/5	\$1779
486DX2/66	212MB	3/3	\$1369
486DX2/66	364MB	3/3	\$1959
486DX2/66	364MB	5/5	\$2019
P60	527MB	4/5	\$2389
P60	527MB	4/5	\$2839

Lease for \$54/mo.

as low as
\$1939



**ThinkPad®
360**



**ValuePoint®
Performance**

ThinkPad 360® notebooks

**HOT
PRODUCT**

- ▲ 486SL/33 processor
- ▲ 4MB RAM exp. to 20MB
- ▲ Modular design, removable hard drive & floppy drive
- ▲ Local Bus Graphics with 1MB video RAM
- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ TrackPoint II integrated pointing device
- ▲ IBM DOS 6.3, Windows 3.1, Lotus cc:Mail, Organizer, ScreenCam, Official Airline Guide FlightDisk, CoSessions Host, Prodigy, America Online, and FaxWorks 3.0

- ▲ Port Replicator and Docking Station available

Screen	Hard Drive	Price
9.5" Monochrome	170MB	\$1939
9.5" Monochrome	340MB	\$2419
9.5" Dual Scan	170MB	\$2519
9.5" Dual Scan	340MB	\$2999
8.4" Active Color	170MB	\$3389
8.4" Active Color	340MB	\$3869

ThinkPad® 510 subnotebook

- ▲ IBM 486BL/50 processor
- ▲ 4MB RAM exp. to 20MB
- ▲ 200MB hard drive
- ▲ 7.7" color display
- ▲ Type II PCMCIA slot
- ▲ TrackPoint II integrated pointing device
- ▲ 3.5" external floppy drive
- ▲ Weighs only 3.8 lbs.
- ▲ IBM DOS 6.3, Windows 3.1, Lotus cc:Mail, Organizer, ScreenCam, Official Airline Guide FlightDisk, CoSessions Host, Prodigy, America Online, and FaxWorks 3.0

CALL

Compaq Compleat

LTE Elite

- ▲ 486 processor
- ▲ 4/8MB RAM, Exp. to 20/24MB
- ▲ Built-in AC adapter
- ▲ Removable hard drive
- ▲ 2 Type II or 1 Type III PCMCIA slots
- ▲ Integrated trackball
- ▲ MS-DOS 6.0, Windows 3.1, MS Video for Windows Runtime

Processor	Display	Hard Drive	Price
486DX2/40	9.5" Dual scan	170MB	\$3119
486DX2/40	8.4" Active	170MB	\$3779
486DX2/40	8.4" Active	340MB	\$4159
486DX2/50	9.5" Mono	250MB	\$3299
486DX2/50	9.5" Active	340MB	\$4999
486DX4/75	9.5" Active	340MB	\$5669
486DX4/75	9.5" Active	510MB	\$6139

Lease for \$114/mo.

Concerto

- ▲ 4MB RAM expandable to 20MB
- ▲ 9.5" mono display
- ▲ 2 Type II or 1 Type III PCMCIA slots
- ▲ Untethered intelligent pen
- ▲ MS-DOS 6.0, Windows 3.1, InkWare NoteTaker

Processor	RAM	Hard Drive	Price
486SL/25	4MB	120MB	\$1229

Lease for \$50/mo.

Contura Aero

- ▲ Type II PCMCIA slot
- ▲ Integrated trackball
- ▲ Weighs only 3.5 lbs. (mono), 4.31 lbs. (color)
- ▲ MS-DOS, Windows 3.1

Processor	Display	Hard Drive	Price
486SX25	8.0" Mono	170MB	\$1139
486SX33	7.8" Passive Color	170MB	\$1699
486SX33	7.8" Passive Color	250MB	\$1889

Lease for \$50/mo.

ProLinea Desktops

- ▲ 4MB RAM expandable to 100MB
- ▲ 3.5" floppy drive
- ▲ Local bus graphics
- ▲ Pentium upgradable
- ▲ Energy Star compliant
- ▲ MS DOS 6.0, Windows 3.1

Processor	RAM	Hard Drive	Price
486SX/33	4MB	200MB	\$1049
486SX2/50	4MB	200MB	\$1169
486DX2/66	4MB	340MB	\$1489
486DX2/66	4MB	525MB	\$1639
486DX4/100	8MB	340MB	\$1999
486DX4/100	8MB	525MB	\$2139

*Compaq color monitors start at \$259.99

PCM 10/94B

PCs COMPLEAT

THE BEST: BRANDS • PRICE • DELIVERY • SERVICE

Open 24 Hours

Weekdays
Weekends & Holidays
8 A.M. to 8 P.M. E.T.

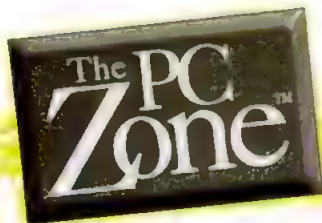
CALL TODAY!

800-775-4727

International (508) 624-6400

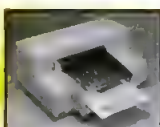
COMPAQ

CIRCLE 268 ON READER SERVICE CARD



**WHERE AMERICA'S
BUSINESSES SHOP
WITH CONFIDENCE**
1-800-252-0386

BRAND NAMES.



HP DeskJet 560C \$568⁹⁸
Inkjet Color Printer
◆ 600x300 dpi with HP's Resolution Enhancement Technology

The HP DeskJet 560C Inkjet Printer provides advanced color printing through ColorSmart technology and 600x300 dpi resolution. It prints on plain, special or glossy paper, transparencies and envelopes. And comes with a three year warranty for affordable, high-quality printing for years to come. Hewlett-Packard #13686

Supra Express FAXModem 14.4i Internal for Windows
◆ 14,400 data send/receive \$79
data/fax modem

SupraExpress FaxModem 14.4i Internal is a 1/2 card for Windows users on IBM PC & compatible computers and comes with everything you need to get started: fax software, cables, manuals, and a free subscription to online services. It offers a complete data/fax solution and carries a five-year manufacturer's limited warranty. Supra W#15748

D09944 Abracadata Design Your Own Railroad \$32.98

Adobe
B13024 Acrobat Personal Distiller \$449.98
B13021 Acrobat Starter Kit \$650.00
W10791 Illustrator 4.0 w/Streamline 3.0 \$429.00
W11903 Photoshop 3.0 \$549.00
W12745 Photoshop 3.0 V/U \$144.90

Aldus
W07215 Aldus FreeHand 4.0 Win \$360.00
W12748 Aldus FreeHand 4.0 Win V/U \$139.00
W09058 Aldus PageMaker 5.0 Win \$559.00
W13204 PageMaker 5.0 Single user Lic Pk \$438.00
W12562 Aldus PageMaker 5.0 V/U \$139.00
W12740 TouchBase 1.0 Win/Quicken 3.0 \$29.90

W13495 Allegro Clinton Health Security Plan \$12.90
B97164 Amer S/W Phone Disc USA Biz \$48.90

Amegran Training
W13927 Barbie PC Fashion Design & Color \$18.90
W13928 Creature Maker \$18.90
W14109 Teach Me Excel 4.0 Win/Word Win \$26.90
W14112 Teach Me Lotus 1-2-3 v. 3.4 \$26.90
W14108 Teach Me MS DOS 6/Win 3.1/PC386-486 \$24.90
W14113 Teach Me Win 3.1 \$24.90
W14114 Teach Me WordPerfect 5.2 Win \$24.90
B14848 The Computer Carnival \$24.90
W13929 The Great Computer Adventure \$24.90

W13201 Arabesque ECGO Pro 2.0 \$179.00
W13245 Arabesque ECGO Simplicity 2.0 \$80.00
W14425 Aris FontChameleon and FontLiber8 \$184.90
W14419 Autodesk AutoCAD LT Win \$440.00
D07617 Autodesk Generic CAD 6.1 \$280.00
W11335 Avantis ManagePro 2.0 Win \$229.00

BERKELEY
W07787 After Dark 2.0 Win \$27.90
W13701 The Disney Collection Scr. Svr \$27.90

Borland
W07326 Borland C++ 4.0 \$330.00
W13991 Borland C++ 4.0 CD-ROM Spec/U \$180.00
W11567 Borland C++ 4.0 Spec/U \$99.00
W13989 Borland Visual Solutions Pk \$92.00
D12414 dBASE 5.0 DOS \$514.00
D12400 dBASE 5.0 DOS V/U \$149.00
W15787 dBASE Win \$330.00
W15794 dBASE Win V/U \$189.00
W11872 Paradox 5.0 \$334.00
W16496 Paradox 5.0 Comp/U \$184.00

Caere
W12309 OmniPage Direct Win 2.0 \$90.00
W09785 OmniPage Pro 5.0 Win \$400.00

Lotus 123 Release 5 W12397 \$94 UPGRADE
New Version!

Clarin
W13575 Claris Works Win w/Fax Works \$50.00
W11328 FileMaker Pro 2.1 Win \$114.00
W11722 FileMaker Pro 2.1 Trade Up \$80.00

Corel
W15095 Corel CD PowerPack \$34.00
W16032 Corel GALLERY \$34.00
W18850 Corel VENTURA 5.0 Win CD-ROM \$314.90
W16009 CorelDRAW 3 CD \$99.00
W12712 CorelDRAW 3 to 5.0 CD & Disk \$410.00
W12711 CorelDRAW 3 to 5.0 CD only \$324.00
W12556 CorelDRAW 4 Win \$360.00
W12581 CorelDRAW 4 Win V/U \$228.00
W13211 CorelDRAW 4 Win V/U CD only \$139.00
W12710 CorelDRAW 4 to 5.0 CD & Disk \$229.00
W12709 CorelDRAW 4 to 5.0 CD & Wacom ArtZ \$404.00
W16038 CorelDRAW 4 to 5.0 CD only \$178.00
W16037 CorelDRAW 5 CD-ROM Only \$400.00

W12593 CorelSGSI 2 DOS, Win, and OS/2 \$80.00
D09149 Datastorm ProComm Plus 2.01 \$80.00
W11145 Datastorm ProComm Plus Win \$84.90
W13704 Datazix Conversions Plus Win \$92.00
W09577 Delrina WinFax Pro 4.0 \$80.00
W12898 DesignCAD 2D Win 7.0 \$174.00
B97165 Digital Dir. Phone Disc Residential \$40.00
B97166 Digital Dir. Phone Disc Reverse \$140.00
W13926 Elseware Font Works \$70.00
W13941 Fauve Malisse 1.20 \$80.00
W14492 Firefly PhotoGenix Pro Ed \$129.00
W07475 Fractal Design Painter 3.0 Win \$318.00
W11188 FrameMaker 4 Win \$370.00

Microsoft Office 4.3 W12153 \$265
Competitive & Version Upgrade!

IBM
W14753 OS/2 2.1 Win \$48.00
W14754 OS/2 2.1 Win CD Ver \$35.00

W13955 IdeaFisher Win \$84.00
W15967 Imageware ImageWizard \$80.00
W15968 Imageware Morph Wizard \$80.00
W13917 IMSI The Art of Business \$144.00
W07857 Inset HulaK Pro Win 2.0 \$70.00
W14763 Iterated Images Inc. II \$80.00
W14785 Iterated Images Inc. w/Fractal Vid. Clip \$139.90
W07946 Jean Ben Plan Builder \$78.00
W14277 Lester Reunion - The FamilyTree Win \$84.00

Lotus
W13366 CC Mail 10 User Pk 4.0 \$225.00
D09854 CC Mail DOS Platform Pk 4.0 \$180.00
W12499 CC Mail Win Plat Pk Quick Ref Set \$90.00
W09853 CC Mail Win Platform Pk 2.0 \$324.00
W15303 CC Mail Grp Pk DOSWIN 10-User 2.0 \$569.00
D07203 CC Mail Remote 3.1 (DOS) \$149.00
W07430 FreeLance 2.01 Win V/Comp/U \$94.00
W07164 FreeLance Win 2.01 \$330.00
D09581 FreeLance Graph 4.0 20133 \$328.00
W16657 Improv 2.1 License Pk \$85.00
W16656 Improv Win 2.1 \$95.00
D07805 Lotus 123 2.4 DOS \$332.00
D11059 Lotus 123 2.4 U \$90.00
D11988 Lotus 123 2.4 U Lic Pk \$84.00
D09592 Lotus 123 3.4 \$395.00
D07149 Lotus 123 3.4 U 090627 \$83.00
D07148 Lotus 123 3.4 U 090637 \$93.00
W09658 Lotus 123 Win 1.1 012652 \$360.00
W11342 Lotus 123 Win 1.1 Server \$365.00
W12397 Lotus 123 Rel 4.01 Win V/Comp/U \$94.00
W12395 Lotus 123 Rel 4.01 Win \$282.00
W12497 Lotus 123 Rel 4.01 Win Lic Pk \$245.00
W11998 Lotus Ami Pro 3.0 U Lic \$50.00
W09557 Lotus Ami Pro 3.01 Win \$240.00
W15332 Lotus Ami Pro R3.01 Comp/U \$94.00
W13570 Lotus Approach 3.0 Win \$84.00
D09894 Lotus FreeLance 4 Comp/U 90523 \$90.00
W13564 Lotus Improv 2.1 \$310.00
W13772 Lotus Notes 3.0 Server \$409.00
D13583 Lotus Notes OS/2 Client \$480.00
W13581 Lotus Notes Win Client 3.0 \$400.00
W11193 Lotus Organizer Win 1.1 \$94.00
W12406 SmartSuite 2.1 \$440.00
W13869 SmartSuite 2.1 Doc Pk \$183.00
W12408 SmartSuite 2.1 V/Comp/U \$280.00

Macromedia
W12866 Director 3.1 Player Win \$718.00
W99514 Dir 3.1.3 w/Dir 3.1 Player Win \$1,248.00
W15786 Meca Managing Your Money Win 1.0 \$34.00

W14434 Publisher's Paradise Pro CD-ROM \$34.90
Micrografix
W14443 ABC Flowchart Win 3.0 \$290.00
W13793 Designer 4.0 \$450.00

Microsoft
W11642 WFW 3.11 (Win for Workgrp) \$131.00
W11645 WFW 3.11 Add-on Win 3.1 User \$42.00
W11770 WFW 3.11 Intro to Networking \$29.00
W11643 WFW 3.11 MLP Lic Pk \$110.00
D12225 DOS 6.21/U \$44.00
D12226 DOS 6.21/U \$44.00
D12150 DOS 6.21/U 3PK \$113.00
D13882 DOS 6.21/U Step-Up \$9.00
W15406 Excel 5.0 Win Comp/U \$114.00
W07893 Excel 5.0 Win V/U \$80.00
W07975 Excel 5.0 Win \$290.00
W11888 FoxPro 2.6 Std. Ed. \$30.00
W12413 FoxPro Win & DOS 2.5-2.6 Dist. Kit \$18.00
W12093 FoxPro Win 2.5 to 2.6 U \$18.00
D16370 FoxPro 2.6 DOS Lic Pk \$79.00
D12091 FoxPro 2.6 DOS \$80.00
W16368 FoxPro 2.6 Pro DOS \$442.00
W16366 FoxPro 2.6 Pro Win \$228.00
W16367 FoxPro 2.6 Pro Win/V/any \$278.00
D16369 FoxPro 2.6 Pro V/U DOS \$18.00
D12096 FoxPro V/U from 2.5 to 2.6 DOS \$18.00
W13552 Office 4.2 Win Pro \$350.00
W16352 Office 4.2 Win/U on CD ROM \$265.00
W12153 Office 4.2 Win V/Comp/U \$285.00
W10564 Office 4.2 Win \$404.00
W13060 Office 4.2 Win CD ROM \$454.00
W11174 Office 4.3 Pro MLP 1 User \$469.00
W17833 Office 4.3 Pro MLP/U 1 User \$335.00
W17831 Office 4.3 Pro V/Comp/U \$355.00
W13553 Office 4.3 Pro CD ROM \$530.00
W13552 Office 4.3 Pro Win \$530.00
W17847 Office Assistant Win \$84.00
W07209 PowerPoint 4.0 Win V/Comp/U \$114.00
W11213 PowerPoint 4.0 Win \$280.00
D17743 Project 4.0 DOS \$297.00
W12157 Project 4.0 Win \$410.00
W07947 Project 4.0 V/U Win \$134.00
W11647 WFW 3.11 Add-on Win 3.1 Sngl M \$30.00
W15405 WFW 3.11 Add-on Win 3.1 20 MM \$672.00
W07752 Win 3.11 \$80.00
D08942 Word 6.0 DOS \$214.00
W13888 Word 6.0 Win V/U \$80.00
W09974 Word 6.0 Win \$210.00
W07404 Word 6.0 Win Comp/U \$110.00

Novell
W11036 Midsoft Studio 3.1 Win \$160.00
W96919 Miramar Personal Mac/An Connect \$124.00
W14293 Music Wave Piano! \$80.00

WordPerfect 6.0A & Quattro Pro Bundle W13894 \$292

NOVELL
B16058 NetWare 3.12 10 user 3.5 \$1,500.00
B16065 NetWare 3.12 100 user CD \$4,430.00
B16060 NetWare 3.12 25 user 3.5 \$2,340.00

Peachtree
W11078 Peachtree Acctg Win 3.0 \$114.00
D11327 Peachtree Complete Acctg 8.0 \$170.00
D15976 Photodisc Picture Factory Set 1 \$34.00
W99551 Pixar OneTwentyEight Vol. 1 \$170.00
W11740 Pixar TwentyEight Win 1.1 \$164.00
B07980 Presentation Task Force 4.0 \$80.00
W14149 Pro CD Select Phone \$179.00
W11910 QuarkXPress 3.0 Win \$500.00
W09768 Quicken Win 3.0 \$39.00
D09707 Renaissance QEMM 386 7.03 \$50.00
B96514 Sense Interactive America \$39.00

W14845 Sense Interactive Earth Air Fire Water \$40.00
W15109 Shapeware Visio 2.0 Win \$129.00
Softkey
W10777 Amer Heritage Dictionary III \$30.00
B95594 Amer Heritage Talking Dictionary CD \$30.00
W11919 Calendar Designer Plus 2.0 Win \$44.00
W15055 Land Designer Plus \$44.00
W15054 MyHouse Win \$44.00
B94301 Sports Illus. Sports Almanac CD Win \$30.00

Stagesoft
W07480 SPC Harvard Graphics 2.0 Win \$270.00
W09051 Slac Electronics Stackler 4.0 Win/DOS \$94.00

Stagesoft
D14787 Acctg For Sm Biz LAN Std. P \$270.00
D14762 Acctg For Sm Biz Bonus Pk \$130.00
D14786 Acctg For Sm Biz LAN Bonus Pk \$340.00
D14758 Acctg For Sm Biz Std. Pk \$90.00

Symantec Norton Utilities 8.0 W07380 \$99
New Version!

T/Maker
W12895 Incredible Image Pak CD ROM \$84.00
B14423 Studio Series Design Group CD \$700.00

D14292 Write Pro 1/2/3/4 \$50.00
B11902 Three-G Images w/Impact! CD ROM \$270.00
W13273 Timeslips 5 Win \$184.00
W12214 Traveling S/W LapLink V (Win/DOS) \$99.00
W12888 Virtus WalkThrough 1.1 \$110.00
W12878 Vouddette Flowerscape \$44.00

WordPerfect
W12392 Borland Office 2.0 Win \$300.00
W15079 Borland Office 2.0 V/U \$222.00
W12391 Borland Office 2.0 Comp/U \$274.00
D12383 WP 6.0 DOS \$274.00
W09740 WP 6.0A Win \$280.00
W13860 WP 6.0A V/Comp/U Win \$74.00
D12158 WP Presentation 2.0 Comp/U \$90.00
D11127 WP Works Addt. Lic Pk \$50.00
W13877 WP 6.0 Comp Trade Up Win CD-ROM \$128.00
D16179 WP 6.0 DOS Documentation \$31.00
D12386 WP 6.0 DOS V/U \$80.00
W13876 WP 6.0 Win/U CD-ROM \$94.00
W13872 WP 6.0A Win CD ROM \$312.00
W13894 WP 6.0A Win & Quattro Pro 5.0/8 \$280.00
W13896 WP 6.0A Win & Quattro Pro 5.0 V/U \$129.00
W13895 WP 6.0A Win & Quattro Pro Comp/U \$129.00
W13872 WP 6.0A Win CD ROM \$312.00
W10697 WP 6.0A Win Lic Pk w/docs \$211.00
W13876 WP 6.0A Win V/U CD ROM \$94.00
W13373 WP Present 2.0 Win Lic Pk w/Docs \$200.00
W13375 WP Present 2.0 Win Single/U \$70.00
W13374 WP Present 2.0 Win Lic Pk w/DOC \$172.00
D15496 WP Works 1.0 \$80.00

COMPATIBILITY KEY
W=Windows D=DOS B=Both
UPGRADE KEY
B = Bundle
U = Upgrade
V/U = Version Upgrade
Comp/U = Competitive Upgrade
V/Comp/U = Version Competitive Upgrade

**Knowledgeable
Sales Advisors help
make buying easy!**



Credit cards are not charged until the order is shipped. Most products ship the same day for overnight delivery. Packages shipped overnight at \$6 for the first 7 pounds and \$1 for each additional pound or UPS at carrier's actual rate. Call for international shipping rates. Packaging and handling \$4 per order. Returns subject to a restocking fee. Prices and product availability subject to change without notice. Specials and promotions may be limited to stock on hand.

**IF YOU
DON'T SEE
IT...CALL!**



COMPUTER DISCOUNT WAREHOUSE

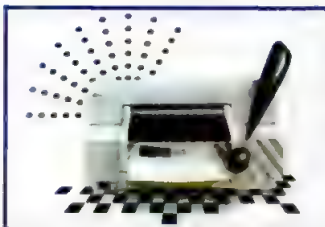
WHY PAY RETAIL? CDW® Sells For Less!

Your #1 source for Hewlett Packard printers and accessories



DeskJet 520 Monochrome Inkjet Printer

- ✓ 600 x 300 dpi with Resolution Enhancement
- ✓ Up to 3 ppm print speed
- ✓ 3 year limited warranty
- ✓ Parallel interface
- ✓ Prints on plain or glossy paper, transparencies, and envelopes



ONLY!

\$284.10 CDW 37907



DeskJet 500C Color Inkjet Printer

- ✓ Resolution: 300 dpi
- ✓ 24-bit (16.7 million) color support
- ✓ 256 grayscale levels
- ✓ Switchable monochrome and color printheads
- ✓ Up to 3 ppm print speed
- ✓ 3 year limited warranty
- ✓ Parallel interface
- ✓ Prints on plain or glossy paper, transparencies, and envelopes

ONLY!

\$343.20 CDW 20875

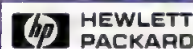


DeskJet 560C High-Resolution Color Inkjet Printer

- ✓ 600 x 300 dpi with Resolution Enhancement
- ✓ 24-bit (16.7 million) color support
- ✓ 256 grayscale levels
- ✓ Resident monochrome and color printheads
- ✓ Up to 3 ppm print speed
- ✓ 3 year limited warranty
- ✓ Parallel interface
- ✓ Prints on plain or glossy paper, transparencies, and envelopes

ONLY!

\$558.84 CDW 38421



LaserJet 4L The lowest-priced HP LaserJet EVER!

- ✓ 300 dpi, 4 PPM
- ✓ 1MB RAM std.
- ✓ PCL 5, 26 scalable fonts
- ✓ Energy Star Certified



ONLY!

\$669.56 CDW 29080

LaserJet 4P

- ✓ True 600 dpi, 4 PPM
- ✓ 2MB RAM std., 26MB max.
- ✓ PCL 5, 45 scalable fonts
- ✓ Energy Star Certified

ONLY!

\$969.74 CDW 32135



Genuine Products at CDW Prices!

Printer Supplies
and Accessories

51625A DeskJet 500C Ink Cart-Color.....	28.36	CDW 21340
51626A DeskJet High Capacity Ink Cart.....	26.06	CDW 21759
C3067A DeskJet 310 Color Kit.....	37.93	CDW 33976
51606C PaintJet Ink Cart-Color.....	28.81	CDW 13115
51606A PaintJet Ink Cart-Black.....	26.45	CDW 16688
51639A PaintJet XL300 Ink Cart-Black.....	20.19	CDW 23984
51639C PaintJet XL300 Ink Cart-Cyan.....	22.68	CDW 23985
51639M PaintJet XL300 Ink Cart-Magenta.....	22.68	CDW 23986
51639Y PaintJet XL300 Ink Cart-Yellow.....	22.68	CDW 24007
51640A PaintJet 1200C Ink Cart-Black.....	26.40	CDW 29968
51640C PaintJet 1200C Ink Cart-Cyan.....	28.88	CDW 29969
51640M PaintJet 1200C Ink Cart-Magenta.....	28.88	CDW 29971
51640Y PaintJet 1200C Ink Cart-Yellow.....	28.88	CDW 29970
51636H PaintJet Glossy Paper-8.5 x 11.....	49.59	CDW 24128
92295A LaserJet 2/2D/3/3D Toner.....	86.26	CDW 11444
92275A LaserJet 2P/3P Toner.....	76.34	CDW 16378
92274A LaserJet 4L/4P Toner.....	65.29	CDW 29554
92298A LaserJet 4/4M Toner.....	113.88	CDW 25386

If You Find a Better
Price, Call CDW®
Before You Buy!

CDW® Sells for Less and Services You Better!

(800) 998-4CDW

PCM1045

©1994 CDW® Computer Centers, Inc.

NEW!
Lease Option
Call for Details

COMPUTER DISCOUNT WAREHOUSE

COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW® Sells For Less!



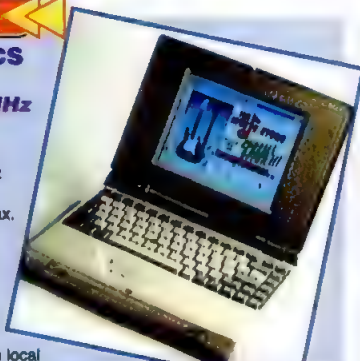
Toshiba Notebooks

NEW!

Toshiba T2400CS and T2400CT

The ultimate 50MHz color notebook value

- ◆ 3.3 volt IntelDX2™ 50MHz CPU
- ◆ 4MB RAM std., 20MB max.
- ◆ 250MB or 320MB hard drive
- ◆ 9.5" dual-scan color display (T2400CS)
- ◆ 8.4" active matrix color display (T2400CT)
- ◆ Graphics accelerator with local bus video
- ◆ 1) 14.5mm Type III PCMCIA slot
- ◆ 1) Type II PCMCIA slot
- ◆ SCSI-2 interface
- ◆ Options: internal sound card, port replicator
- ◆ Keyboard-integrated AccuPoint™ pointing device
- ◆ NiMH battery, 2+ hours life
- ◆ Software: MS-DOS, Windows™ for Workgroups, SCSI, PCMCIA and Toshiba utilities
- ◆ Weighs only 6.5 lbs.
- ◆ 1 year warranty



TOSHIBA

T2400CS, 250MB hard drive.....	\$2877.59	CDW 43341
T2400CS, 320MB hard drive.....	\$3058.44	CDW 45054
T2400CT, 250MB hard drive.....	\$3597.75	CDW 43342
T2400CT, 320MB hard drive.....	\$3799.16	CDW 43343

T4800CT 75MHz Color Notebook

Unsurpassed performance and superior multimedia capabilities

- ◆ SL-enhanced IntelDX4™ 75MHz CPU, 16KB cache
- ◆ 8MB RAM std., 24MB Max. ◆ 500MB hard drive
- ◆ 9.5" active matrix TFT-LCD color display
- ◆ Integrated 16-bit audio, built-in microphone and speaker ◆ 2 PCMCIA slots: Type II and Type III
- ◆ Serial, parallel, keyboard/mouse, audio, CRT and expansion bus ports ◆ Advanced NiMH battery: 2+ hours ◆ Pre-installed MS-DOS®, Windows™ for Workgroups ◆ 3 year warranty



\$5487.47 CDW 39099

Toshiba T3600CT 50MHz performance, subnotebook portability

- ◆ 3.3 volt IntelDX2™ 50MHz CPU
- ◆ 4MB RAM std., 20MB max.
- ◆ 250MB hard drive
- ◆ 8.4" active matrix color display
- ◆ 1) Type II PCMCIA slot
- ◆ Keyboard-integrated AccuPoint™ pointing device
- ◆ Standard external floppy drive
- ◆ 3 year warranty



T3600CT.....\$3997.39 CDW 43339

NEW!

Toshiba T1960CS and T1960CT

Fast and affordable Toshiba quality

- ◆ 3.3 volt IntelDX2™ 50MHz CPU
- ◆ 4MB RAM std., 20MB max.
- ◆ 200MB or 320MB hard drive
- ◆ 9.5" dual-scan color display (T1960CS)
- ◆ 8.4" active matrix color display (T1960CT)
- ◆ 1) 14.5mm Type III PCMCIA slot
- ◆ BallPoint mouse with QuickPort
- ◆ 1 year warranty

TOSHIBA



T1960CS, 200MB hard drive.....	\$2347.57	CDW 42627
T1960CS, 320MB hard drive.....	\$2598.90	CDW 45052
T1960CT, 200MB hard drive.....	\$2996.96	CDW 42628
T1960CT, 320MB hard drive.....	\$3289.91	CDW 42629

T1910 and T1910CS

- ◆ SL-enhanced i486SX/33
- ◆ 4MB RAM std., 20MB max.
- ◆ 200MB Hard Drive
- ◆ monochrome (T1910) or dual-scan color (T1910CS) display
- ◆ Microsoft BallPoint mouse with QuickPort



TOP SELLER

T1910.....	\$1458.68	CDW 38817
T1910CS.....	\$1997.11	CDW 35983

CDW TOP SELLER CDW

T4700CT

Uncompromised performance, flexibility and expandability

- ◆ SL-enhanced IntelDX2™ 50MHz CPU
- ◆ 8MB RAM std., 24MB max.
- ◆ 200MB or 320MB hard drive
- ◆ 9.5" active matrix color display
- ◆ integrated 16-bit audio and microphone
- ◆ PCMCIA slots: 1) Type II and 1) Type III (16mm)
- ◆ BallPoint mouse with QuickPort
- ◆ Ports: serial, parallel, mouse and keyboard, audio, expansion bus, CRT
- ◆ NiMH battery, 2+ hours life
- ◆ Pre-loaded MS-DOS® and Windows™
- ◆ 3 Year Warranty



TOSHIBA

T4700CT, 200MB.....	\$4437.50	CDW 33642
T4700CT, 320MB.....	\$4767.08	CDW 33644

If You Find a Better Price, Call CDW® Before You Buy!

CDW® Sells for Less and Services You Better!
(800) 998-4CDW

PCM1045

©1994 CDW® Computer Centers, Inc.

ALWAYS WORKING TO KEEP YOUR COMPUTING NEEDS AHEAD!

COMPUTER DISCOUNT WAREHOUSE™

PCsources says...
Kenosha Computer Center
 offers some of the Best
 Buys in Mail Order!

EXPERIENCE THE KENOSHA DIFFERENCE

- Over Seven Years of Service
- Thousands of Satisfied Customers
- Terrific Technical Support
- Everyday Low Prices
- No Surcharge on Credit Cards

KENOSHA COMPUTER CENTER:
YOUR DIRECT SOURCE for
SERVICE and VALUE.
CALL US TODAY!

EPSON®

FX 870.....	\$259	FX 1170.....	\$345
LQ 570+.....	\$235	LQ 870.....	\$425
LQ 1070.....	\$355	LQ 1170.....	\$589
DFX 5000.....	\$1299	DFX 8000.....	\$2189
STYLUS 800 INKJET.....	\$239		
STYLUS 400/1000 INKJET.....	\$239/\$429		
ACTION LASER 1000/1100.....	\$579/\$479		
ACTION LASER 1500/1600.....	\$589/\$929		
SCANNER 600/800.....	\$749/\$879		
SCANNER 1200 PRO.....	\$1189		

STYLUS COLOR Inkjet Printer

Highest inkjet resolution available. 720 dpi produces images difficult to distinguish from photos. \$545

KENOSHA COMPUTER CENTER

SALES LINE OUTSIDE WISCONSIN
1-800-255-2989

Shipping/customer service/technical assistance, call
414-697-9595 • FAX 414-697-0620



hp HEWLETT PACKARD

NEW: LASERJET IV PLUS.....	\$1419
LASERJET IV/IVM PLUS.....	\$1279/\$1949
LASERJET IVP/IVMP.....	\$959/\$1369
LASERJET IVL/IVML.....	\$669/\$1039
LASERJET IVSI/IVSIMX.....	\$2989/\$4299
2MG/4MG/8MG UPGRADE.....	CALL
HP HP/ICX SCANNER.....	\$489/\$949
DESKJET 520/560C.....	\$289/\$569
DESKJET 550C.....	\$429
DESKJET 1200C or 1200C/PS.....	CALL

720 DPI
 COLOR

OKIDATA®

ML320/ML321.....	\$295/\$415
ML520/ML521.....	\$365/\$489
ML590/ML591.....	\$409/\$559
ML395/ML395 COLOR.....	\$949/\$1029
PM3410.....	\$1199
OL400E/OL410E 800DPI.....	\$495/\$545
OL410E POSTSCRIPT.....	CALL
OL810/OL830.....	\$899/\$1089
OL850+.....	\$1189
DOC IT 3000/4000.....	\$1799/\$2129

Panasonic

Office Automation

4400/4410 Lasers.....	\$499/\$449
4430/4440 Lasers.....	\$639/\$589
4455/5400 Lasers.....	\$1499/\$779

intel OVERDRIVE

- PROCESSOR UPGRADES**
- For any Intel 486 based system
 - Improves system performance up to 70%
 - Accelerates all DOS, Windows, OS/2 and Unix applications
 - Cost effective upgrade to next generation CPU technology

Overdrive SX2-50 Double 20-25 Mhz.....	\$179
Overdrive DX2-50 Double 20-25 Mhz.....	\$219
Overdrive DX2-66 Double 33 Mhz.....	\$259

CYRIX DOUBLERS

CX486SRX2-20/40 OR SRX2-16/32.....	\$219
CX486DRX2-20/40.....	\$219
CX486DRX2-25/50.....	\$259
CX486DRX2-33/66.....	\$299

MEMORY PRODUCTS

IBM PS1 486 4MB/8MB.....	\$179/\$349
COMPAQ PROLINEA 4MB/8MB.....	\$169/\$329
4MB IBM THINKPAD 700, 700C.....	\$209
4MB TOSHIBA 2000, 2200, 1850C.....	\$209
4MB TEXAS INST. TRAVELMATE.....	\$199
1 & 4 MB SIMMS.....	CALL
2 MB FOR OKI 400.....	\$125
2 MB FOR EPSON ALL.....	\$139
2 MB FOR H-P HP, IIP & III.....	\$109
HP LASERJET MEMORY.....	CALL

CALL FOR ALL OTHER MODELS & MFG.

DIGITIZERS & CD-ROM

SUMMASKETCH 12x12.....	\$269
SUMMASKETCH 12x18.....	\$499
SUMMASKETCH 24x36.....	\$1219
NEC 3XP/4X PRO.....	\$379/\$589
NEC 3X/3XE TRIPLE SPIN.....	\$399/\$429

BATTERY BACKUPS AMERICAN

250/400.....	\$99/\$155
450/600.....	\$189/\$259
900/1250.....	\$369/\$485
SMART UPS 400/600.....	\$289/\$339
SMART UPS 900/1250.....	\$469/\$589
TRIPLITE all models.....	CALL

"BUBBLEJET" PRINTERS

BJ 10SX.....	\$239
BJ 200E.....	\$249
BJ 230.....	\$389
BJC 600.....	\$485

(COLOR)

LASER PRINTERS

LBP 430.....	\$579
LBP 860.....	\$1069
600 DPI, 8PPM	

Canon



NOTEJET COMPUTERS

NOTEJET 486 SX33 340 MG.....	\$1959
NOTEJET 486 SX33 200 MG.....	\$1759
NOTEJET 486 SX 33Mhz 120 MG Color.....	\$2099
NOTEJET 486 SX 33Mhz 200 MG Color.....	\$2349
NOTEJET II SLC2-50 130 MG.....	\$2199

Notejets have Built-in Bubblejet printer,
 4mg RAM, 2 PCMCIA slots, DOS, Windows.

INNOVA NOTEBOOKS

486SL-25 120MG.....	\$1199
DUAL SCAN COLOR.....	\$1799

All Innovas have 4mg RAM, FAX Modem,
 DOS, Windows and built-in trackball.

HARD DRIVES

SEAGATE 250 MB 3290A.....	\$199
SEAGATE 420 MB ST1480A.....	\$259
SEAGATE 452 MB 3550A.....	\$289
SEAGATE 645 MB ST3655A.....	\$329
SEAGATE ST12400 9ms, 2.14 GB BUNDLED W/ADAPTECH 1542C, FAST SCSI 2.....	\$1649
CONNER CFA 420MB IDE.....	\$259
CONNER CFA 540MB IDE.....	\$329
CONNER CFA 1.08GB IDE.....	\$589
CONNER 340MB SCSI.....	\$289
CONNER 1000S 1.08GB SCSI.....	\$749
CONNER CFP1080S 9ms, 1.08GB BUNDLED W/ADAPTECH 1542C, FAST SCSI 2.....	\$999

TAPE BACK UP

COLORADO TRACKER 250.....	\$275
COLORADO JUMBO 250.....	\$149
COLORADO JUMBO 120.....	\$89
COLORADO 2 GB EXT.....	\$1069
COLORADO 4 GB EXT.....	\$1399
CONNER 250 MB INTERNAL.....	\$149
CONNER 250 MB EXTERNAL.....	\$289
QIC 80 TAPES.....	\$17

SOFTWARE

ALDS PAGEMAKER.....	\$499
COREL DRAW ON CD.....	\$279
LOTUS 123 VER 2.4/3.4.....	\$279/\$325
MICROSOFT EXCEL/WINDOWS.....	\$299
MICROSOFT OFFICE.....	\$449
MICROSOFT WORD/WINDOWS.....	\$299
NORTON UTILITIES 7.0.....	\$99
PC ANYWHERE HOST REMOTE.....	\$99
WORD PERFECT 6.0.....	\$249
WORD PERFECT WINDOWS 6.0.....	\$289

ALL OTHER TITLES...CALL

NOTEBOOKS

TEXAS INSTRUMENTS	
486 4000E SX-25 120MB Color.....	\$1849
486 DX2-40 200 MB Color.....	\$2889
486 DX2-50 200 MB Mono.....	\$2279
486 DX2-50 200MB ACTIVE Color.....	\$2829
486 4000E DX4-75 MHz.....	\$3549
SHARP	
PC 8850 With 200 MB, 2 PCMCIA SLOTS, 4MB RAM, 8.4" COLOR ACTIVE MATRIX SCREEN.....	\$2549

MONITORS

MAG DX15F/MX15F.....	\$349/\$439
MAG DX17F/MX17F.....	\$559/\$759
MAG DX21F.....	\$1759
Mitsubishi Diamond Scan 15FS.....	\$409
Mitsubishi Diamond Pro 17".....	\$819
Mitsubishi Diamond Pro 21T.....	\$1949
NEC 3FGE/3V.....	\$549/\$459
NEC 4FGE.....	\$589
NEC 5FGE/5FGP.....	\$989/\$1079
NEC 6FGP.....	\$1949
Nanao 340 IW/F550 I.....	\$649/\$899
Nanao T560 I/F550 IW.....	\$1459/\$979
Nanao F560 IW/T760W.....	\$1229/\$1989
Viewsonic 15.....	\$419
Viewsonic 17/17G.....	\$579/\$789
Viewsonic 20.....	\$1499
Viewsonic 21.....	\$1679
CTX 5468A/1451.....	\$249/\$249
CTX 1661/1760.....	\$319/\$629

GRAPHICS CARDS

ATI GRAPHICS ULTRA+ 2MB.....	\$189
ATI GRAPHICS PRO 2MB.....	\$259
ATI GRAPHICS PRO TURBO.....	\$349
DIAMOND STEALTH PRO 1 MB.....	\$219
DIAMOND VIPER 2MB.....	\$319
HERCULES GRAPHITE 2MB.....	\$339

No charge for MasterCard or Visa. We ship COD on a cash or
 cashier's check basis only. Shipping & handling 3% (8% minimum,
 \$10 minimum on printers); AK and HI slightly higher. Returned
 items may be subject to restocking fee. Purchases orders
 accepted from Fortune 1000, Government institutions,
 schools and universities.
 Prices and availability
 subject to change.

FAX MODEMS

PRACTICAL PERIPHERALS	
PRACTICAL 14.4/28.8 POCKET.....	\$259/\$389
PRACTICAL 14.4 INT/EXT.....	\$105/\$119
PRO CLASS 14.4 INT/EXT.....	\$149/\$159
PRACTICAL 28.8 INT/EXT.....	\$219/\$229
PRACTICAL PCMCIA 14.4.....	\$285

HAYES

OPTIMA 14.4 EXT.....	\$349
OPTIMA 28.8 INT/EXT.....	\$349/\$399
ACCURA 14.4 / 28.8.....	\$119/\$255
POCKET 14.4.....	\$289
PCMCIA 14.4.....	\$259

U.S. ROBOTICS

SPORTSTER 14.4 INT/EXT.....	\$109/\$129
SPORTSTER 14.4 W/FAX INT/EXT.....	\$115/\$135
SPORTSTER 28.8 W/FAX INT/EXT.....	\$199/\$219
V.32 TERBO W/FAX.....	\$345
WORLD PORT 14.4 PCMCIA.....	\$195

QVC

14.4 INT/EXT FAX MODEM.....	\$79/\$89
28.8 INT/EXT FAX MODEM.....	\$169/\$185

intel

SATISFACTION 200 24/96 INT.....	\$199
SATISFACTION 400 INT 14.4/14.4.....	\$259
SATISFACTION 400 EXT 14.4/9600.....	\$289
FAX MODEM 14.4/14.4 INT.....	\$ 79
FAX MODEM 14.4/14.4 EXT.....	\$ 99
PCMCIA 24/96.....	\$129
PCMCIA 14.4/14.4 FAX MODEM.....	\$189

NETWORKING

NETWARE 3.12 5 USER.....	\$589
NETWARE 3.12 10 USER.....	\$1289
NETWARE 3.12 25 USER.....	\$1849
NETWARE 3.12 50 USER.....	\$2349
NETWARE 4.0.....	CALL
NE 2000 or 5 PACK.....	\$689/\$329
LANTASTIC 6.0 STARTER KIT.....	\$409
LANTASTIC 6.0 NETWORK ADD ON.....	\$149
NODERUNNER SI 2000T 10 PAK.....	\$689
LANTASTIC CENTRAL STATION.....	\$325
BOCA PCMCIA 10BT.....	\$145
BOCA HUB 16 PORT TP.....	\$239
BOCA 10BT ETHER 10 PAK.....	\$489
3COM 3C509.....	\$115
3COM 3C509 5 PAK.....	\$429
3COM 3C589 COMBO PCMCIA.....	\$229
3COM 3C529 16/32 MCA.....	\$225
3COM 3C579TP EISA TP.....	\$225
LINK BUILDER FMSII 24 PORT.....	\$989
INTEL ETHER 16.....	\$89
INTEL ETHER 16 5 PAK.....	\$419
INTEL ETHER 16 20 PAK.....	\$1579
INTEL ETHER FLASH 5 PAK.....	\$479
INTEL ETHER FLASH 20 PAK.....	\$1799
INTEL ETHER COMBO/5 PAK.....	\$115/\$509
INTEL ETHER COMBO 20 PAK.....	\$1899
SMC 3512TP CONC 12 PORT.....	\$ 509
SMC 3608TP CONC 8 PORT.....	\$289
XIRCOM POCKET ADAPTER.....	\$249
XIRCOM PCMCIA ETHER ADAPTER.....	\$229
XIRCOM POCKET ETHER PRINT SVR.....	\$269

KENOSHA COMPUTER CENTER

2133 91st Street
 Kenosha, Wisconsin 53143

KENOSHA COMPUTER CENTER

1-800-255-2989

CIRCLE 242 ON READER SERVICE CARD

Mon.-Fri. 8am-7pm • Sat. 9am-3pm

INTRODUCING THE FIRST EXPANDABLE UPGRADEABLE FLEXIBLE AFFORDABLE STEREO MODULAR MULTIMEDIA MACHINE

Words can hardly begin to describe the Slimnote® 5 Series notebooks from Twinhead. That's because no other notebook offers you so much.

Thanks to its unique modular design, you can quickly customize your Slimnote to fit your needs perfectly. Even if what you need tomorrow is different from what you need today.

Want to add more RAM, a faster CPU, a bigger hard drive, or update your screen? A modem, network card, infra-red or extra battery? You can do it yourself in seconds. Just snap in the module you need and you're ready to go.

For even greater flexibility, the optional Docking Station gives you two ISA slots and one drive bay. And the optional I/O Slice adds SCSI II and MIDI/game ports. It also duplicates all ports on the Slimnote, so you can dock with just a single connection.

MULTIMEDIA TO GO

If you make presentations on the road, Slimnote is the ideal notebook for you. You get built-in stereo sound, two speakers, a microphone, 1 Mb of video acceleration, plus your choice of two brilliant color displays. Until now, you needed a desktop machine to get multimedia performance as good as this!

ORDER DIRECT FROM THE TRUE SOURCE™

For more than a decade, Twinhead has been building computers for some of

the biggest names in the business. Now we're offering our superior quality and reliability direct to you. And when you buy from us, you're protected by our 30 day money-back guarantee, worldwide ExpressCare™ service, and a lifetime of toll-free technical support from the True Source — the people who actually built your computer.

ORDER DIRECT AND SAVE!

1-800-995-8946

Monday thru Friday, 8am to 5pm, PDT

PCM1094

Slimnote 550S. Only \$2,479

IntelDX2/50; 9.4" Dual Scan color display; 4 Mb RAM; 260 Mb hard drive; integrated 25mm trackball.

Slimnote 550T. Only \$3,879

IntelDX2/50, 9.4" TFT Active Matrix color display; 8 Mb RAM; 340 Mb hard drive; integrated 25mm trackball.

Slimnote 5100T. Only \$4,299

IntelDX4/100, 9.4" TFT Active Matrix color display; 8 Mb RAM; 340 Mb hard drive; integrated TwinTouch™ pointing device.

Monochrome model available — call for details.

Two steps ahead™
Twinhead®



Two crisp, colorful 9.4" displays to choose from. For an excellent value, get the 256-color Dual Scan (standard with Model 550S). Or for a screen that rivals any desktop monitor, get the TFT Active Matrix (standard with 550T and 5100T).

New TwinTouch™ pointing device, a Slimnote exclusive, is the next step beyond trackballs. Moving the cursor is as easy and intuitive as moving your finger. TwinTouch comes standard on Model 5100 and as an optional upgrade on the 550S and 550T.

Don't settle for tiny 8-bit sound. Slimnote gives you vibrant 16-bit stereo, with two speakers and a microphone built right in. It's the multimedia machine that fits in your briefcase!

The PCMCIA slot, which accepts two Type IIs or one Type III, gives you virtually unlimited expansion.

Get maximum performance from Windows™ with 1 Mb of video on the local bus. Your Slimnote will work beautifully with any VGA monitor, at resolutions up to 1024 x 768.

Want to double your battery life? Simply slide out the floppy-drive module (included with your Slimnote) and replace it with a second battery pack.

You can easily remove the hard-drive module for instant expandability, easy servicing and total data security. Hard drives as large as 500 Mb are available.



FREE CARRYING CASE

Order now and we'll include, at no extra charge, a custom padded carrying case.

YES! ☐ Send me the Slimnote 5 Series notebook model I have checked below.

☐ 550S ☐ 550T ☐ 5100T

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

Please add \$29 shipping and handling. CA and NJ residents please add appropriate sales tax.

METHOD OF PAYMENT:

☐ Check enclosed. (Payable to Twinhead Corp.)

☐ Charge to my:



CARD NUMBER _____

EXP. DATE _____

SIGNATURE _____

DAYTIME PHONE _____

Twinhead Corporation
1537 Centre Pointe Drive Milpitas, CA 95035
408-945-0808 Fax 408-945-1080

✓ Widest Selection ✓ Top Name Brands ✓ Quality Products ✓ Knowledgeable Sales Staff

TEXAS INSTRUMENTS

Intel DX486SX processor
3.5" 100MB hard disk drive
Microsoft BallPoint with QuickPort connection

TravelMate™ 4000E W/486SX/775

Only **\$3599**

HARDWARE

BATTERY BACKUPS

American Power BK2500 / BK4000 97/148	
American Power BK900 / BK900	185/249
American Power BK900 / BK1250 359/465	
American Power AP400 / AP600	279/334
American Power AP900	479
American Power AP900NET	530
American Power UPT250	819
American Power UPS 220V Models	CALL
Tripp Lite BC250 / BC400	35/145
Tripp Lite BC500 / 500 LAN	189/179
Tripp Lite BC600 LAN / 750 LAN	229/289
Tripp Lite BC900 LAN / 1250 LAN	339/439
Tripp Lite Omni 500 LAN/600 LAN	239/275
Tripp Lite Omni 750 LAN / 1250 LAN	339
Tripp Lite Omni 750 LAN / 1250 LAN	545
Tripp Lite LC1200 / LC1800	139/187

TAPE BACKUP

Colorado DJ-20 250M	155
Colorado Tracker 250M	289
Colorado PT-25 2GB SCSI w/Intel Int.	930

DRIVERS

Calcomp XG11 12x18 16-button	965
Kurta XGP 8x8	230
SummaSketch III 12x18/24x36 Pro	279/479
SummaSketch III 24x36	1129
Wacom Art/6x8	299

PLOTTERS

Calcomp Designmate 3024S	1479
HEWLETT PACKARD	ALL MODELS
Pacific Data Pro Tracer II	1029

CONTROLLERS

Adaptec 1542 SCSI-2 ISA w/FP	195
Adaptec 2742 SCSI-2 ISA w/FP	289
Adaptec 2842 SCSI-2 VESA w/FP	255
Adaptec 2940 PCI SCSI Master	289
Boca IDE 2-HDD, 2-FDD IDE02	29
Boca IDE 2-HDD, 2-FDD 2-err, 1-par	49

GPU UPGRADES

Cyrix 386 to 486 CPU Upgrade	CALL
Intel 486SX 35 to 50 Overdrive	189
Intel 486DX 33 to 66 Overdrive	279
Intel Math Co-processor/All Models	CALL

Easy Payment Methods!

- Purchase orders accepted from educational institutions, federal & state agencies and approved corporations.
- All major credit cards accepted.
- C.O.D.'s welcome.

Policy Information

- Your credit card is not charged until the merchandise is shipped. Personal and company checks will only collect 2 weeks. No cash charge for credit cards. All prices subject to change.
- For orders outside the USA we require payment by wire transfer or American Express credit card. We check for stolen credit cards. All items for credit, repair or exchange must have a return authorization number issued by our customer service department. All returned merchandise must be shipped to our main warehouse located at: 180 Livingston Drive, Buffalo Grove, IL 60089

HARDWARE

SCANNERS

Avec 2400 Designer	589
Hewlett Packard Scanjet 2P grayscale	489
Hewlett Packard Scanjet 2CX Color	949
Microtek Scanmaker II G w/OmniScan	379
Microtek II SP color w/PhotoShop LE	749
Microtek II HR High Resolution color	1049
Microtek Scanmaker III 36-bit	2449
Musitek Scammage Color Handheld	2249
Relays 2412 PC w/PhotoShop	749
Umax UC300 w/PhotoShop LE/OnPage	599
Umax UC840 w/PhotoShop LE/OnPage	999

DRIVES

Conner CFS210A 210M 14ms IDE	179
Conner CFS420A 420M 14ms IDE	239
Conner CFS450A 528M 12ms IDE	289
Conner CFA1080A 1616 IDE	645
Imaging ALL MODELS	CALL
Maxtor 7445A 345M IDE	205
Maxtor 7546A 548M 12ms IDE	295
Microplate 4410 1 giga 8ms SCSI-2	685
Microplate 2217 1.7GB 10ms SCSI-2	895
Microplate 1929 2.1GB 11ms SCSI-2	1399
Seagate ST3243A 214M 16ms IDE	178
Seagate ST3391A 314M 13ms IDE	225
Seagate ST3481A 428M 14ms IDE	239
Seagate ST5481A 548M 12ms IDE	299
Seagate ST5481A 548M 12ms IDE	299
SyDex 88M Rmtvl 88 Intek	464
Syquest Puma 88M ext.	535
Teac FD505 dual floppy drive	103
Teac / Toshiba Floppies	ALL 55

MODEMS

Boca Pocket Modem 14.4 w/Fax	157
Boca VOICEModem 14.4	149
Boca VFAST 28.8 Int. / ext.	186/221
Hayes Amodem 28.8 V Fast ext.	265
Hayes Optima 28.8 V Fast Int.	379
Intel PCMCIA 14.4 w/Fax	194
Intel Sales/Zoom 400 Int.	273/Megahertz
Modems for all laptops	CALL
Megahertz JX144 w/Modem	209
Microcom Desktops ES 14.4	179
Microcom Desktops ES 28.8	229
Microcom Desktops Fast ESP 28.8	307
Multitech 1432 ZDX 14.4 Int.	150
Multitech 1432A 14.4 Int/Modem ext.	408
Practical 14.4 w/Fax Int.	109/125
Practical 28.8 w/Fax Int.	219/239
Supra 14.4 w/Fax Int. / ext.	115/129
Supra 28.8 w/Fax Int. / ext.	215/239
Telebit	ALL MODELS IN STOCK
UOS internal & external. All Models in Stock	
USR Sporter 14.4 w/Fax Int.	119/135
USR Sporter 28.8 w/Fax Int. / ext.	209/229
USR Courier V.32 19.2 w/Fax Intek	329/357
USR Courier V.34 Ready Data/Fax Int.	397
USR Worldport 14.4 PCMCIA	189
Zoom VFP 19.2 / VFP24K Int w/Fax	102/109
Zoom V3X35 14.4 G3/232/4230 Int	129

COMPUTERS

AST Bravo LP 486SX/33170M	1189
AST Premiere 486DX2/50 340M 8M	2199
AST Premiere LX Pentium 60 270M	2379
Compaq Prolinea 486SX/50 200M	1189
Compaq Prolinea 486DX2/50 200M	1299
Compaq Prolinea SX/33 200M CD	1375
Compaq Prolinea 486DX4/100 525M	2229
Compaq DeskproXE 560 P60 525M	2849
Compaq Deskpro XL	BEST PRICING
Compaq Prolinea MT Mini-Towers	CALL
Compaq PROQUANT All Models BEST PRICES	
Compaq Prosignia VS Series BEST PRICES	
Ways Terminals	CALL FOR PRICING

We stock 1000's of COMPAQ accessories and upgrades!!!

NOTEBOOK COMPUTERS

AST Ascentin SX33 250M Color	2299
AST Ascentin DX250 250M Color	2579
AST Ascentin DX475 340M Color	3649
Canon Notelet M33/200M	1747
Canon Notelet C33/200M Color	2329
Canon Notelet II C501/300M Color	2159
Canon Notelet II C502/200M Color	2529
Contura AERO SX25 84M Mono	989
Contura AERO SX33 170M STN Cr.	1749
Contura AERO SX33 250M STN Cr.	1942
Compaq Contura 425 120M	1729
Compaq Contura 425 209M	1999
Compaq Contura 425S 120M Color	1899
Compaq Contura 425S 209M Color	2335
Compaq ELITE DX240 170M STN Cr.	3219
Compaq ELITE DX240 170M TFT Cr.	3895
Compaq ELITE DX240 340M TFT Cr.	4299
Compaq ELITE DX250 340M TFT Cr.	5159
Compaq ELITE DX475 340M TFT Cr.	5889
TI TMA000E SX25 Pav Cr 120M	1729
TI TMA000E DX240 Color 200M	2099
TI TMA000E DX250 Mono 200M	2269
TI TMA000E DX250 Pav Cr 200M	2359
TI TMA000E DX250 Aery Cr 200M	2659
TI TMA000E DX475 Actv Cr 340M	3599
TI TMA000E DX475 Actv Cr 455M	3553
TI TMA000M SL25 Mono 120M	1849
TI TMA000M SL25 Pav Cr 120M	2099
TI TMA000M SL25 Actv Cr 200M	2939
TI TMA000M SL250 Pav Cr 200M	2779
TI TMA000M SL250 Actv Cr 340M	3369
TI TMA000M DX475 Actv Cr 340M	4959
Toshiba T1980 CS 450 200M STN Cr.	2399
Toshiba T1980 CT 450 200M TFT Cr.	3029
Toshiba T2400 CS 450 200M STN Cr.	2699
Toshiba T3400CT SX-33 Color 120M	2275

MONITORS

ADI MicroScan 4G 15" 1280x1024 28 409	
CTX 14" 1024x768 28 MP/PIII	249
CTX 15" 1562GM 1280x1024 MP/PIII	339
CTX 15" 1280x1024 28 MP/PIII	349
CTX 17" 1280x1024 28 Digital	679
Goldstar 1460DL 14" 1024x768 28	235
Idtek MF-5315 15" 1024x768 28	419
Idtek MF-8617 17" 1280x1024 28	789
Idtek MF-8621 21" 1600x1200 28	1899
Idtek MF-9421 21" 1600x1200 28	1939
Idtek MF-8621 21" 1600x1200 28	2299
Mag DX15F 1280x1024 28	379
Mag DX17F 1280x1024 28	669
Mag DX17F 1280x1024 28	859
Mitsubishi Dmd Scan 17" 1280x1024 899	
Mitsubishi Dmd Scan 20" 1024x768 1549	
Nanaco F340W 15" 1024x768 28	648
Nanaco F550W/F550W 17" 28	889/979
Nanaco F560W 17" 1280x1024 28	1249
Nanaco T560 17" 1280x1024 28	1459
Nanaco T660 20" 1280x1024 30	2029
Nanaco F760W 21" 1280x1024 28	1989
Nanaco F760W 21" 1600x1200 28	CALL
NEC FG63V 15" 1024x768 28	549/549
NEC FG63V 15" 1024x768 28	839
NEC FG63V 17" 1280x1024 28	969
NEC FG63V 21" 1280x1024 28	1659
Optquest 2000 DS 15" 1024x768 28	369
Optquest 2000 DC 15" 1280x1024 27	429
Optquest 4000 DC 17" 1280x1024 27	749
Optquest 4000 TC 17" Trinitron	829
Sony CPD115F1 15" 1280x1024 25	439
Sony CPD117F 17" 1280x1024 25	859
Sony GDM-175E1 17" 1600x1280	965
Sony GDM 2036S 20" 1280x1024 30	1859
Sony GDM 2036S 20" 1600x1200 27	1969
ViewSonic V15E 15" 1024x768 28	369
ViewSonic V17G 17" 1280x1024 28	839
ViewSonic V21 1800x1280 25	1789

NETWORKING

National Semi NE2000+ 110BT	83
National Semi NE4100T PCMCIA 10BT	108
Natwre 3.12 5-user	549
Natwre 3.12 10-user	1249
Natwre 3.12 25-user	1849
Natwre 3.12 50-user	2448
Natwre 3.12 100-user	3449
Natwre 3.12 250-user	CALL
Natwre SFT 3.11 BEST PRICE	CALL
Natwre V4.02 5-user / 10-user	719/559
Natwre V4.02 25-user / 50-user	2289/3189
Natwre V4.02 100-user / 250-user	4549/5750
Natwre V4.02 500-user / 1000-user	CALL
NETWARE UPGRADES BEST PRICE	
Novell DOS 7.0/Personal Netware	69
Novell Personal Netware 5-user	259
Pacific Data Direct Net 10-48 ENET	279
Pacific Data Direct Net 10-48	449
SMC Arcnet PC130 / PC270E	89/108
SMC Arcnet PC650 w/ethernet	123/198
SMC Arcnet 8-port Coax Active Hub	225
SMC Ethernet+ Elite 16-bit Coax / 10BT	115
SMC Ethernet+ Elite 16-bit Combo	134
SMC Ethernet+ Elite 32-bit EISA 10BT	579
SMC Elite 16 Ultra Ethernet Coax / 10BT	99
SMC Elite 16C Ultra Ethernet Combo	118
SMC Ethernet 8-port 10BT Concentrator	289
SMC Ethernet 12-port 10BT Concentrator	539
Thomas Conrad 6245 Arnet 16-bit	178
Thomas Conrad 3045 STP 10Mbps	448
Thomas Conrad 3045ST 100Mbps fiber	704
Thomas Conrad 3047 CX 10Mbps EISA	599
Thomas Conrad 3050 STP 8-port Hub	1188
Xicom Pocket Arcnet Coax	229
Xicom Pocket Ethernet 10baseT	259
Xicom Pocket Ethernet Coax	259
Xicom Pocket Token Ring Adapter	455
Xicom Pocket Ethernet Print Server Coax	299
Xicom Pocket Ethernet Print Server 10BT	289
Xicom Parallel Port Multiplexer	77
Xicom Credit Card Enet 16-bit Cr. / 10BT	209
Xicom Credit Card Enet 16-bit Coax	229
Xicom Credit Card Enet 16-bit Combo	259

MULTIMEDIA

MULTIMEDIA

Creative Labs Digital Edge 3X CD-Interp	
Creative Labs Discovery 16 Int.	315
Creative Labs Omni CD Int. / ext. 205/365	
Creative Labs Omni CD 3X Int.	429
Creative Labs Gamblestar CD Int bundle	375
Creative Labs Edumaster II 16 Int.	412
MediaVision MV-2000 Super Family Deluxe	333
MediaVision MV-4000 Super Deluxe	365
MediaVision MV-4000 Premium ext.	499
MediaVision Pro Deluxe Ed. MV5000	889
MediaVision Pro 16 Multimedia III	665
Orchid Soundwave/CD	359

VIDEO CAPTURE

ATech Wavecapture/TV	319
Creative Labs Video Blaster FS 2000	309
MediaVision ProMovie Studio	179
TrueVision Video VGA16	760
TrueVision Targa-16 / 64	1089 / 1589
Sigma Real Magic VCAI	289
Sigma Real Magic SCSI	415
Willow Laptop TV	529
Willow TV 4000	359

CD-ROM DRIVES

Chiconi CD535 220ms SCSI-2 Int.	255
Chiconi CD535 220ms w/Intel Int.	289
Hitachi CD6750 220ms SCSI-2	319
MediaVision Pro 180ms ext.	279
NEC CD-R400 portable	359
NEC CD-R400 Int.	429
NEC CD-R400 ext.	489
NEC CD-R400 external 4X Pro	725
Plexor 3028 Int 240ms	285
Plexor 4Plex Quad Speed Int.	449
Sony CDU-33A01 W	189
Sony CDU-551 Int. SCSI 205ms	219
Sony CDU-6811 ext. SCSI 295ms	419
Toshiba X4410BS Int. SCSI 300ms	225
Toshiba X4410BS Int. SCSI 300ms	285

OPTICAL DRIVES

Pinnacle Tahoe 128M ext.	829
Pinnacle Sierra 1.3GB PC Int.	2829
Pinnacle P40-650M ext. Parallel	3045
Plasma Recordable CD Int.	2279 / 2439
PLI Infinity 88/94W44 88M Int.	387
Sony SMOE321F 128M Int 40ms	999
Sony SMOE321 128M Int 40ms	2049

SOUND BOARDS

MediaVision ProAudio Studio 16	122
Media Vision Premium 3-D SC52	139
Orchid Soundwave 32	185
Sound Blaster Pro Value Ed.	79
Sound Blaster 16 Value Ed.	149
Sound Blaster AWE 32	264
Sound Blaster 16 MCD	169
Sound Blaster 16 ASP MCD	169
Sound Blaster 16 SCSI 2 ASP	205
Wave Blaster Daughter Bnd.	179
Turtle Beach Daytona 88M Int.	265
Turtle Beach Multisound Tahl	242
Turtle Beach Multisound Monterey	329
Turtle Beach Audio Adv PCMCIA	124
Waymarr 410ePS	239

SPECIALS

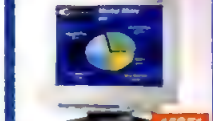
UMAX UC300

This three pass flatbed scanner captures your originals in 24-bit color, gray-scale, halftone or line art at resolutions up to 1200 x 1200dpi. Ideal for scanning and reproducing photos to integrate into desktop publishing, presentation and photo design. Comes with Adobe Photoshop LE & OnPage Direct \$599

SOFTWARE

Download 2D for Windows	
Within minutes, you can turn your ideas into professional design/development complete with 500 applets, dimensions, drafting and editing toolboxes, materials list, scaling menu.	
Layers, & support of 7 file formats.	
DOS version also available	\$182
Thousands of Titles In Stock!	

SONY



15" Flat Trinitron

- 15" Flat Square Tube
 - 25mm Aperture Grille Pitch
 - Max Resolution: 1280x1024
 - Energy Star & MPF-II
 - Digital Microprocessor Controlled
- \$439**

PRINTERS

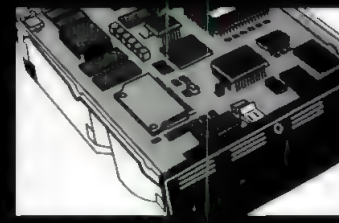
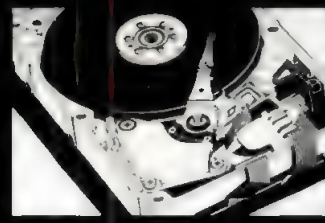
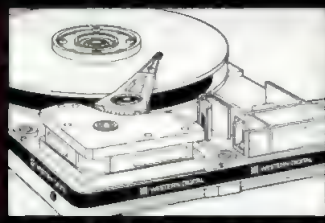
CANON

BJ10SX	239
BJ200E	248
BJ220	337
BJ-800 Color	489
BJ-800 Color	489

MEGAHAUS

HARD DRIVES

The Drive Authority!



UNEQUALED REPUTATION
Nobody knows drives like MegaHaus. We have specialized in storage solutions for over 8 years. Repeat business from satisfied customers is the backbone of our business. We satisfy our customers.

DIRECT REPLACEMENT WARRANTY
During the first year of your warranty, we replace, not repair, any defective items. All items receive lifetime technical support from our factory trained techs.

SAME DAY SHIPPING
Our multi-million dollar inventory offers you the best diversity and availability in the market. We ship most orders the same day. Each order is checked at least four times for accuracy.

FAST, EASY INSTALLATION
Anyone can sell you a hard drive. We sell easy to install storage solutions. We spend countless hours researching the best solutions, then create our quick precise installation guides for each kit.

UNBEATABLE DEALS

WESTERN DIGITAL
#1 IDE drives. 3 year warranty, 128K read/write disk cache. MegaHaus unbeatable price!

420MB	12ms	WDAC2420	\$220
540MB	12ms	WDAC2540	\$310
730MB	10ms	WDAC2700	\$420

MICROPOLIS
Best buy large capacity drives! 5 year advanced replacement warranty. MegaHaus unbeatable price! Choose IDE or SCSI.

1050MB	8.5ms	MC4110	\$599
1740MB	10ms	MC2217	\$899

Seagate
Baracuda drives, 7200rpm, 1MB buffer. FAST! MegaHaus unbeatable price! WIDE SCSI in stock.

1690MB	8ms	ST11950N	\$1249
2139MB	8ms	ST12550N	\$1269
4290MB	8ms	ST15150N	\$2389

TEAC COMPLETE KIT!
FAST! FAST! QUAD SPEED!
180ms, QUAD SPEED CD ROM drive, with Creative Labs Sound Blaster 16 sound card, CD Bundle (The Animals, Encyclopedia, ChessMaster 3000, World & US Atlas, Typing Tutor) ONLY \$559

IOMEGA FIVE YEAR WARRANTY!
INCLUDES 1 FREE TAPE!
250MB tape backup. \$10 drive discount w/ hard drive sale.
Internal (mounts in 3 1/2" or 5 1/4" drive bay) \$159
External for printer port \$319
3 Pack of Preformatted DC2120 tapes \$40

WIDE SCSI
Includes drive (5yr warranty), controller, & cable.

	1Gig	2Gig	4Gig
PCI	\$1099	\$1729	\$2899
VESA or EISA	\$1199	\$1829	\$2999

HARD DRIVES CONNER

IDE				
210MB	14ms	CFS210A	\$176	
420MB	14ms	CFS420A	\$219	
541MB	12ms	CFA540A	\$298	
811MB	10ms	CFA810A	\$425	
1080MB	9ms	CFP1080A	\$565	

HARD DRIVES Quantum

IDE				
270MB	12ms	LPS270A	\$195	
342MB	12ms	LPS340A	\$206	
541MB	12ms	LPS540A	\$269	
SCSI				
170MB	14ms	ELS170S	\$179	
270MB	12ms	LPS270S	\$195	
342MB	12ms	LPS340S	\$237	
541MB	12ms	LPS540S	\$289	
1080MB	10ms	IMP1080	\$619	
1440MB	9.5ms	IMP1440S	\$809	
2160MB	9.5ms	IMP2160S	\$1119	

Maxtor

170MB	15ms	7171A	\$172
540MB	12ms	7546A	\$285

IBM

270MB	12ms	70G8487	\$209
364MB	12ms	70G8488	\$219
527MB	12ms	70G8486	\$319
728MB	12ms	70G8511	\$399
1052MB	8.6ms	70G8512	\$649

MICROPOLIS

IDE				
1050MB	10ms	MC4110A	\$599	
1740MB	10ms	MC2217A	\$899	
SCSI				
1052MB	8.5ms	MC4110	\$599	
1740MB	10ms	MC2217	\$899	
3020MB	11ms	MC1936	\$1899	
SCSI-AV Audio / Visual tuned drives				
1000MB	10ms	MC4110AV	\$689	
1700MB	10ms	MC2217AV	\$989	
3000MB	11ms	MC1936AV	\$2049	

IBM

270MB	12ms	94G2439	\$219
364MB	12ms	94G2440	\$255
527MB	12ms	94G2441	\$329
728MB	12ms	94G2422	\$449
1052MB	8.6ms	70G8492	\$649
2040MB	9.2ms	70G8493	\$1219
4250MB	11ms	90F0780	\$2269

Seagate

213MB	16ms	ST3243A	\$175
260MB	16ms	ST3290A	\$192
341MB	13ms	ST3391A	\$212
420MB	14ms	ST3491A	\$222
545MB	12ms	ST5660A	\$292
SCSI (WIDE SCSI also available)			
1690MB	8ms	ST11950N	\$1249
1700MB	9ms	ST11900N	\$1079
2145MB	8ms	ST12550N	\$1269
2148MB	9ms	ST12400N	\$1169
4290MB	9ms	ST15230N	\$2299
4290MB	8ms	ST15150N	\$2389

SYQUEST

SCSI		Drive	PC Kit	Mac Kit
44/88MB	SQS110C	\$269	\$439	\$415
105MB	SQ310SS	\$239	\$399	\$329
200MB	SQS200C	\$399	\$599	\$519
270MB	SQ3270S	\$429	\$569	\$489
PRINTER PORT EXTERNAL (IDE)				
105MB	\$399	270MB	\$619	
CARTRIDGES Qty 1 / 5 or with drive				
44MB \$66/61	88MB \$99/91	105MB \$65/61		
200MB \$116/107	270MB \$93/89			

WESTERN DIGITAL

341MB	12ms	AC2340	\$218
425MB	12ms	AC2420	\$220
540MB	11ms	AC2540	\$310
730MB	10ms	AC2700	\$420
1083MB	10ms	AC31000	\$570

MISCELLANEOUS

Macintosh Drives	Hard Disk Cards
PCMCIA drives	Floppy Drives
IBM PS/1, PS/2, and Tandy Drive upgrades	

SCSI CD ROM DRIVES

NEC	CDR900	4X	180ms	\$939
NEC	CDR510	3X	195ms	\$309
Plexstor	PX43CH	4X	150ms	\$475
Toshiba	XM3401	2X	200ms	\$259
Toshiba	XM4101	2X	320ms	\$215
Teac	CD50	2X	265ms	\$209
Media Vis.	SH193K	2X	280ms	\$159

HOT DEAL, Macintosh external \$255
Pioneer External CD Changers (300ms)
DRM602X 6 disc 307KB/sec \$699
DRM604X 6 disc 612KB/sec \$1049
DRM1804X 18 disc 612KB/sec \$2079

MULTIMEDIA KITS
SCSI Drive, sound card (in retail pkg)
PREM=Media Vision Premium 3D, PRO=Media Vision Pro 3D, SB=Sound Blaster 16 SCSI, SA=Sound Blaster SCSI ASP.

	PREM	PRO	SB	SA
SH93R	\$309	\$445	\$309	\$379
XM4101	\$365	\$489	\$359	\$425
CD50	\$359	\$485	\$359	\$425
XM3401	\$425	\$549	\$425	\$479
CDR510	\$499	\$619	\$499	\$559
PX43CH	\$659	\$779	\$659	\$699
CDR900	\$1129	\$1249	\$1129	\$1189

CONTROLLER CARDS

ADAPTEC	A1522BASIC 16bit SCSI	Alone	w/Drive
	A1542CBASIC 16bit SCSI	\$119	\$109
	A2742 EISA SCSI	\$225	\$215
	A2842 VESA SCSI	\$319	\$309
	FUTURE DOMAIN	\$279	\$269
	1680SVP 16bit SCSI	\$155	\$139
	QLOGIC PCI SCSI & WIDE	\$325	\$309
	PCI 4IDE, incl. CD ROM & FAST ATA	\$59	\$49
	ALPHA RESEARCH CACHING CARDS		
	\$4251 16bit IDE	\$99	\$89
	\$4751 32bit Local Bus IDE	\$139	\$129
	\$4851 32bit PCI IDE	\$229	\$219
	\$425S 16bit SCSI	\$229	\$219
	\$475S 32bit Local Bus SCSI	\$369	\$359
	GSI 16bit IDE accelerators (enhanced IDE)		
	1533-21 2IDE, 4 Floppy	\$65	\$55
	1533-32 2IDE, 4 Floppy, IO	\$129	\$109
	4C 16bit supports 8 IDE	\$139	\$119

SCSI TAPE DRIVES
Kit includes 16bit card, DOS or Windows software & 1 tape. Bare Kit

250MB	Conner	C2150	\$349	\$569
\$25MB	Conner	C2525	\$489	\$699
\$80MB	Teac	MT01F	\$399	\$599
\$20-15Gig	Exabyte	2501	\$499	\$699
2Gig	Conner	4320	\$749	\$899
2Gig	HP	35470	\$889	\$999
4-8Gig	Conner	4324	\$999	\$1109
4-8Gig	HP	35480	\$989	\$1099
4-16Gig	Sony	SDT5000	\$1029	\$1169
4-16Gig	Conner	4326	\$999	\$1139
4-16Gig	HP	C1533A	\$1379	\$1579

SMART STORAGE SOLUTIONS
Smart Storage Solutions manufactures quality storage upgrades, and offers them at aggressive prices. All products include toll free support!

OPTICAL DRIVES
High quality, high performance optical drive solutions include 1 disk. Ask for your free "Dare to Compare" fax.

Internal upgrade	\$679	\$579	\$2209
Internal Kit	\$769	\$969	\$2299
External for Mac	\$699	\$899	\$2269

CD ROM DRIVE TOWERS
Multiple CD ROM drives in a single external enclosure. Great for networks, BBS, or business.

	2 Drive	4 Drive	7 Drive
Media Vis. 93R	\$429	\$939	\$1539
Toshiba 4101	\$569	\$1199	\$1999
Teac CD50	\$569	\$1199	\$1999
Toshiba 3401	\$669	\$1499	\$2499
NEC 3X	\$859	\$1829	\$3099
Plexstor 4X	\$1089	\$2529	\$4299
Nec 4X	\$2119	\$4339	\$7489

MEGAHAUS
HARD DRIVES
1110 NASA Rd 1 #306
Houston, Texas 77058

1-800-786-1182
Ad. Code # P102 Sales Hours (Central Standard Time)
8am - 7pm Monday thru Friday 9am - 3pm Saturday
FAX (713) 333-3024 Local (713) 333-1910
We sell within the United States, its territories, and Canada (sorry no international orders)
CIRCLE 018 ON READER SERVICE CARD

NO SURCHARGE
We accept Fortune 500 & Government bids & PO's. We check for COD and Credit Card fraud!
Visa, MasterCard, Discover, American Express

Insight is your one-stop source for computers, hardware and software.

Insight PENTIUM Based Systems

“Fearsome speed, a friendly Price.”

- PC World, 9/94



PCI P60 Special

N0908008W

Intel 60MHz Pentium™ 64-bit Processor
273 pin ZIF socket
PCI Interface Motherboard
2 PCI slots, 1 PCI/ISA slot, 4 ISA slots
8MB RAM, 256K Cache
Enhanced PCI IDE HDD Controller
420MB 13ms IDE Hard Drive
ATI Mach32 PCI Local Bus Video Card with 1MB RAM
14" N.I. SVGA Color Monitor
1.44MB 3.5" Floppy Drive
2 Serial ports, 1 Parallel port, Enhanced 101 key keyboard
Mouse
MS-DOS 6.22 and Windows for Workgroups 3.11
Desktop case, Ultimate Tower case w/ 13 drive bays also available

\$1,699



Your Direct Source
800-327-2007

PCI P90 Special

N1808019W

Intel 90MHz Pentium 64-bit Processor
273 pin ZIF socket
PCI Interface Motherboard
2 PCI slots, 1 PCI/ISA slot, 4 ISA slots
8MB RAM, 256K Cache
Upgradable to 256K
Enhanced PCI IDE HDD Controller
540MB 12ms IDE Hard Drive
ATI Mach32 PCI Local Bus Video Card w/ 1MB RAM
15" N.I. SVGA Color Monitor
1.44MB 3.5" Floppy Drive
1 Bi-directional Parallel port, 2 Serial ports
Enhanced 101 key keyboard
Mouse
MS-DOS 6.22 and Windows for Workgroups 3.11
Desktop case, Ultimate Tower case w/ 13 drive bays also available

\$2,249



Power, reliability, price. It's the Insight computers—powered by Intel's Pentium™ processor.



pentium
PROCESSOR



Lease figure based on a 24 month F.M.V. lease, sales tax and freight not included. Leases are non-cancelable and may require a deposit. Leases are available to business only. The Intel Inside, PCI and Pentium processor logos are registered trademarks of Intel Corporation.

Notebooks

ZENITH

DATA SYSTEMS


Z-NOTEFLEX

- 486SX/33, 486DX2/50 or 486DX4/75 Processor
- 32-bit VL local bus video 1MB VRAM
- 4 or 8MB standard exp. to 24MB
- Choice of 10.4" mono, 10.3" dual scan color, or 9.5" Active
- 3 year limited warranty & incl. Z-CARE™ on-site service for the first year.



486DX4/75Mhz
8MB RAM, 200MB Hard Drive, Dual Scan color
ZNF75CTB/S \$5,179

486DX2/50Mhz, 4MB RAM, 200MB Hard Drive, Dual Scan color
ZNF50CS4/2 2,779

486DX2/50Mhz, 4MB RAM, 340MB Hard Drive, Active color
ZNF50CTB/4 4,599

486SX/33Mhz, 4MB RAM, 200MB Hard Drive, Monochrome
ZNF33MA/2 2,399

FlexDock Port Replicator
ZNFPORTREP 199

Z-Star EX

Cx486DX2/50Mhz w/ coprocessor
4MB RAM, 200MB Hard Drive, Monochrome
ZNS50M4/2 \$1,669

Cx486DX2/50Mhz w/ coprocessor, 8MB RAM, 200MB Hard Drive, Monochrome
ZNS50M8/2 1,899

Cx486Dx2/50Mhz w/ coprocessor 8MB RAM, 340MB Hard Drive, Dual Scan Color
ZNS50CS7/2 2,099

Cx486DX2/50Mhz w/ coprocessor 4MB RAM, 340MB Hard Drive, Active Matrix Color
ZNS50CT4/3 3,199

Cx486DX2/50Mhz w/ coprocessor 8MB RAM, 340MB Hard Drive, Active Matrix Color
ZNS50CT8/3 3,489

Cx486DX2/50Mhz w/ coprocessor 4MB RAM, 200MB Hard Drive, Dual Scan Color
ZNS50CS4/2 2,099



Z-PLAYER

With its fully self-contained sound capabilities and flexible power options—batteries or AC adapter—the portable Z-PLAYER can be used with your PC or stand alone. Play standard music or audio CD's, without PC hookup, transforming your Z-PLAYER into a multifunction personal business/entertainment system.

- Plays on any PC with a type II PCMCIA slot.
- Integrated sound support and power to go.

ZNPLAYER \$489



Now get information on the Internet. E-mail us at:
info@insightd.com

EVEREX

EVER for EXcellence®



Introducing the premier multimedia notebook!

Other built in features

- Weighs as little as 5.9 pounds
- Measures a compact 1.5" high
- Trackball-19mm diameter
- Speaker with keyboard volume control
- Microphone with multi-directional receiver
- Earphone jack
- Pre-installed DOS and Windows
- 2 year manufacturer's warranty

Ports

Docking station, serial, parallel, speakers, headphones, PS/2 mouse or keyboard. External SVGA monitor with 1024 x 768 resolution output.

Removable 3.5" Floppy Disk

Add an extra battery pack, a scanner module, a LAN module or a SCSI CD-ROM interface module!

Removable battery packs

- 3.6V back-up battery
- Quick recharging time of 90 minutes
- Maximum of 5 hours continuous operation
- Maximum of 8 hours idle operation

16 Bit Multimedia Sound

Digital sound effects for the best audio performance! Record, compress, store, and playback voice, sound and music, with the most reliable digitized audio capabilities.

Local Bus Video

1MB VESA Local Bus Windows Accelerator.

Interchangeable HDD makes drive swapping a snap

Genuine Everex accessories available

Choice of two Type II or one Type III PCMCIA socket

Snap off 9.5" LCD display for easy upgrades

Everex STEPNote Models

486 DX2/50
Dual Scan Color
4MB RAM, 250MB HDD.
EVX50CS42 **'2,249**

486 DX4/75
Dual Scan Color
4MB RAM, 514MB HDD.
EVX75CS45 **'2,999**

486 DX4/75
Dual Scan Color
4MB RAM, 340MB HDD.
EVX75CS43 **'2,799**

486 DX4/75 Active
Matrix Color
8MB RAM, 340MB HDD.
EVX75CT83 **'3,699**

486 DX4/75 Active
Matrix Color
8MB RAM, 514MB HDD.
EVX75CT85 **'3,999**

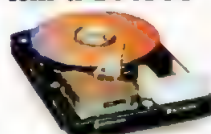
486 SX/33 Dual
Scan Color
4MB RAM, 120MB HDD
EVX33CS41 **'1,999**



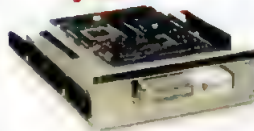
*The E3489 AudioOne™ is a trademark of ESS Technology, Inc.

CIRCLE 219 ON READER SERVICE CARD

Hard Drives



PLUS



WESTERN DIGITAL
540MB IDE HDD, 12ms,
3.5" 1"H

COLORADO
MEMORY SYSTEMS
250MB Tape Backup
with 2 tapes

\$449

WESTERN DIGITAL	WD2540A	IDE	
	540MB, 12ms, 3.5" 1"H.....		\$279
WD2340A	IDE	WD2700A	IDE
340MB, 12ms, 3.5" 1"H.....	\$209	730MB, 12ms, 3.5" 1"H.....	379
WD2420A	IDE	WD31000A	IDE
420MB, 12ms, 3.5" 1"H.....	219	1080MB, 12ms, 3.5" 1"H.....	499

TEXAS INSTRUMENTS Printers



microLaser

TI microLaser
Pro 600 PS23
8ppm, 6MB TEX1024..... **'1,199**

microWriter

TI microWriter LED
5ppm, 512K TEX1019 469
TI microWriter PS23
5ppm, 2MB TEX1021 619

FUJITSU *Dynamo* MO²³⁰

230MB Removable Storage

Fujitsu 230MB Magneto Optical



- 100% Reliable-100% Reusable
- Includes one 230MB Cartridge
- Unlimited Storage-Simply add cartridges
- 230MB Cartridges less than \$50
- Easy to use-Just like a floppy
- Fast 30ms seek time
- Read/write cache for improved access time
- 2.1MB/sec. data transfer
- SCSI-2

Mac, External
Dynamo w/1 cart. **'999**
ODFJ2512MA

PC, External
Dynamo w/1 cart. **'999**
ODFJ2512PC

PC, Internal w/1 cart.
(incl. SCSI controller) **'999**
ODFJ2512AK



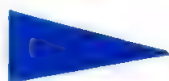
Your Direct Source
800-327-2007

National Accounts - 800-827-2907
Corporate Fax - 602-902-1191
Government Fax - 602-902-1126
Educational Fax - 602-902-1177

Please read and understand all instructions before using. Warranty-Free Operation and 1-year warranty are basic conditions. Lenses are available to businesses only. Lenses are not available for use in 24-hour F.M.V. time, rates and freight are excluded. Lenses are not available for use in any other country. Shipping is not included. All trademarks are the property of their respective owners. The Intel Inside logo and Pentium processor logo and CISC are registered trademarks of Intel Corporation. Typographic errors are subject to correction. Prices may not represent actual product. The following products are subject to a 13% surcharge for which returned to Insight Direct, Inc. for a refund. Non-fragile computers, monitors and printers. All accessories will be handled by the manufacturer on above product. Manufacturer warranty after 30 days. Software will not be accepted for a refund without a receipt. © Insight Direct, Inc. 1992/94

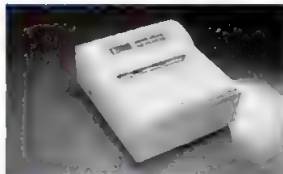
For Printers, It's Arlington!

Thousands
of Printers
In Stock!



OKIDATA

OKILASER 400e - \$495.00



- 4 PPM
- 300 DPI
- 512K Ram
- RISC Processor
- Emulated HP IIP
- 44 Resident Fonts

Tank Tough®

OKILASER 410eps - \$899.00

OKILASER 410e - \$645.00



600 DPI
Class Output

- HP III Compatible
- 2 MB Ram

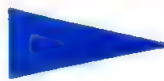
OL810-\$899 OL830-\$1079 OL850-\$1189

MICROLINE 590



- 24 pin
- 120 CPS LQ
- 360 CPS
- 8 Fonts

184 Turbo	\$219	ML590	\$409
ML320	\$295	ML591	\$559
ML321	\$415	ML395	\$949
ML380	\$205	ML3410	\$1199
ML520	\$365	DocIt 3000	\$1799
ML521	\$489	DocIt 4000	\$2199



Canon

LOWER
PRICING!

BJ-600 — \$485.00

Great Color All Around. Whether you're printing text, graphics, or even photographs, the BJC-600 will give you sharp and vivid 360 dpi color output.



- Perfect on plain paper.
- 20 Scalable Fonts.
- A separate ink cartridge for each color, so you don't have to replace all other colors when one runs out.

LBP-430 — \$579.00 LBP-860 — \$1069.00
BJ-10SX - Portable — \$239.00 BJC4000 — \$489.00

BJ-200e — \$249.00

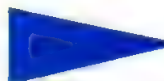
In Stock — the BJ-200e with improved enhancements to the BJ-200, which was the November 1993 PC Magazine's Editor's Choice.



- Up to 33% faster text throughput
- Dramatically improved graphics
- 20 true type fonts
- Reduction mode added

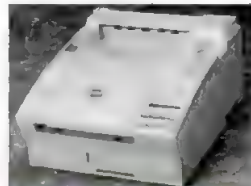
BJ-230 - Wide Carriage \$389.00
BJ-100 \$199.00

Notebook 486-SL 120 MG	\$1199.00
Notejet 486 340 MG	\$1959.00
Notejet 486 200 MG	\$1759.00
Dual Scan Color	\$1749.00
Notejet 120 MG - Color	\$2099.00
Notejet 200 MG - Color	\$2349.00
Notejet II 50 MHZ-130 MG ...	\$2199.00
Notejet II 50 MHZ-260 MG ...	\$2549.00



EPSON

LX300	\$169
FX870	\$259
LQ1170	\$345
LQ570+	\$235
LQ870	\$425
LQ1070+	\$355
LQ1170	\$589
LQ2550	\$879
DFX5000	\$1299
DFX8000	\$2189
Action 3250	\$169
Action Laser 1500	\$589
Action Laser 1500-2MG	\$639
Action Laser 1600	\$929
Stylus 400	\$199
Stylus 800+	\$239
Stylus 1000	\$429
Stylus Color	\$549



ACTION LASER 1500

- PC Computing - "Best PCL5"
- 27 Fonts
- PCL5 Compatible
- 6 PPM

\$589.00

ACTION LASER 1100

- 300 dpi
- 4 PPM
- PCL5 Emul.
- 22 Fonts

\$479.00

Highest print resolution available in an ink jet printer.

720 dpi print resolution

- Produces the finest color images that are difficult to distinguish from a photographic image.
- EPSON's special 720 dpi coated paper eliminates ink from spreading when it hits the page.

360 dpi resolution

- Produces excellent photographic images and the finest color images (non-photographic images, such as standard business graphics).
- Produces the finest monochrome text printing.
- Plain paper or bond paper can be used when printing at this resolution.

Stylus COLOR
INK JET PRINTER

The most advanced color ink jet printer not only in its price class, but in the industry!

\$549.00



FOR ORDERS & QUOTES:

800-548-5105

**Arlington
Computer
Products, inc.**

For Value, It's Arlington!

**Arlington's
10 Year
Anniversary!**

**COLORADO
MEMORY SYSTEMS INC.**

intel.

INTEL OverDrive Processor



Intel OverDrive™
Single-chip
processor
upgrades
that maximize
your PC's
performance.

Want to see a spectacular performance at an affordable price? Then add an OverDrive processor to your Intel 486 SX or DX CPU-based system. Choose from our complete family of OverDrive processors. And watch your power-hungry software take off.

Intel OverDrive processors improve performance of all applications. So you'll fly through your workload with the greatest of ease.

Using Intel's innovative "speed doubling" technology, OverDrive processors run at twice the speed. Applications open and run faster. And you no longer have to wait for that hourglass to disappear.

JUMBO TRAKKER 250 EXTERNAL - \$275.00

- 250 MB capacity
- Plugs into parallel port
- Dual connector shares port with a printer



Jumbo 120 Internal \$99.00
Jumbo 250 Internal \$149.00
Power Tape 1.16B Int. \$649.00
250 Meg Tapes Formatted .. \$17.00

SX2-Double 20-25 MHZ ... \$179.00
DX2-50 Double 20-25 MHZ \$219.00
DX2-66 Double 33 MHZ ... \$259.00

CHIPS

Special Orders - Please Call!

1MB/4MB Simms \$45/\$149
16 MG Simms \$649
Compaq Memory CALL
Epson Action 2 MG \$139
Cyril SRx2-20/40 \$219
Cyril DRx2-20/40 \$219
Cyril DRx2-25/50 \$259
Cyril DRx2-33/66 \$299
HP 4MG Upgrade \$159
Intel 80387 SX/DX \$75/\$85
OKI Laser 2MB \$125

SHARP.

JX9400/H \$389/\$529
JX-9460 \$769
JX-9660PS \$1219
PC-8650 \$2549
PC-8650II \$2749
PC-8660 DX2-50 Active .. \$3595

LEXMARK

4029 Laser Printer 10 ... \$1109
4037 5E LED \$639
Laser 4039 10R \$1269
Laser 4039 12R+ \$1389
Inkjet 4076 \$275
2380+/2381+ \$305/\$435

HEWLETT-PACKARD

Laserjet IV/IV+ \$1279/\$1419
Laserjet IVP w/Toner \$959
Laserjet IVMP w/Toner .. \$1369
Laserjet IVL w/Toner \$675
Laserjet IVML/w/Toner .. \$1039
Laserjet IVM+ \$1949
Laserjet IV SI w/Toner .. \$2989
Laserjet IV SI MX \$4299
HP IIID \$1999
Paintjet XL300 \$2199
HP IV Toner \$99
Jet Direct 2550 \$319
Jet Direct 2382B \$419
1MG Upgrade \$69
2MG Upgrade \$99
4MG Upgrade \$159
8MG Upgrade \$319
Deskjet 256K \$69
Deskjet 310 \$299
Deskjet 550C \$429
Deskjet 520/560C ... \$289/\$569
Deskjet 1200C \$1399
Deskjet 1200C/PS \$2199
2P Scanner \$489
IIC Scanner \$949
Pacific Page/XL \$259/\$699
Pacific Data 25 in 1 Font . \$239

TEXAS INST.

486/DX2/50-200 MG \$2279
486/DX2/50E Color \$2829
486/DX4/75 \$3549
486/50E Active \$2829
MicroMark Color \$379
MicroWriter Basic \$499
MicroWriter PS23 \$675
MicroWriter PS65 \$935
Pro 600 PS23 \$1329
Pro 600 PS65 \$1529

NETWORKING

Netware 3.12 5 User \$569
Netware 3.12 10 User ... \$1299
Netware 3.12 25 User ... \$1869
Netware 3.12 50 User ... \$2349
Netware 3.12 100 User .. \$3399
Netware 4.0 10 User \$1599
Netware 4.0 25 User \$2299
Lantastic Starter 6.0 \$299
Lantastic 6.0 5-User \$329
Lantastic 6.0 10-User \$569
Node Runner 2000C \$169
Node 2000C 6-Pack \$999
Node Runner SI 2000 \$85
Node Runner SI 5-Pack .. \$425
T Runner 8-Port \$289
T Runner 12-Port T/P \$479
NE2000/5-Pack \$69/\$299
SMC Hub 8 Port T/P \$279
SMC TP 12 node Conc ... \$509
SMC+16-6 Pack \$579
SMC Ethercard +/-16 \$89/\$115
3 Com Link Builder \$629
3 Com Etherlink III \$115
Etherlink III 5-Pack \$429
Etherlink III 20-Pack \$1599
Intel Ether 16 \$89
Intel Ether 16-5 Pack \$429
Intel Ether 16-20 Pack ... \$1579
Intel Ether Flash 5-Pack .. \$479
Intel Ether Flash 20-Pack \$1799
Intel Eth. Cmbo/5-Pk \$115/\$509
Intel Ether Pro \$89
Intel Ether MCA \$159
Intel Netport EL \$359
Intel Netport XL \$409
Intel Token 16/S \$329
Thom. Conrad 5143 Coax \$109
TC 5143-10 BT \$85
TC 5143-10 BT 6 BK \$469
TCNS 100 Mbps \$435
Xircom Pocket Ethernet .. \$249
Xircom PCMCIA Ethernet \$229
Xircom Pocket Token \$439

DIGITAL

Decwriter 500I w/color ... \$399
Laser 1800 \$689
Colorwriter 1000 Call

SOFTWARE

Aldus Pagemaker 5.0 \$499
Corel Draw 4.0-CD \$279
Corel Draw 4.0 Upgrd ... \$209
D Base IV \$379
Harvard Graphics 2.0 \$149
Harvard Graphics 3.0 \$359
Lotus 123 2.4/3.4 ... \$279/\$325
Lotus 123 4.0 \$279
Lotus Smart Suite \$379
Lotus Notes Starter \$789
Microsoft Access 1.1 \$295
Microsoft Office \$449
Microsoft Office Pro \$509
Microsoft Word \$289
Microsoft Windows 3.1 ... \$79
Microsoft DOS 6.0 Upg. ... \$59
Norton 7.0 \$109
Q&A \$169
QEMM \$65
Win Fax Pro \$69
Word Perfect 6.0 \$249
Word Perfect Windows ... \$269
Word Perfect 6.0 Upgrd ... \$99

Panasonic
Office Automation

2023 \$179 3123 \$269
2130 \$199 4400 \$449
2124 \$295 4410 \$449
1624 \$379 4430 \$639
2624 \$389 4440 \$989
3624 \$389 5400 \$779
4410/4450I 2 MG ... \$129

SCAN. & DIGIT.

Calcomp 12 x 12-4 \$249
Calcomp 12 x 18-10 \$399
Canon 4015 Scanner \$899
Epson Scanning 600 \$649
Epson Scanning 800 \$859
Epson 1200 Prof. \$1189
Logitech ScanMan 256 ... \$129
Color ScanMan \$249
Mustek Paragon 1200 ... \$789
ScanMan w/Omni Page .. \$139
Summasketch 12x12 \$269
Summasketch 12x18 \$499

*After Rebate

**Arlington
Computer
Products, inc.**

FOR ORDERS & QUOTES:

800-548-5105



DX17F

Ultra high resolution monitor with digital controls.



- 17", dark tinted, non-glare.
- 0.26 mm
- 1280 (H) x 1024 (V)
- Vertical 50-100 Hz
- Horizontal 30-64 kHz

\$659.00

LX1450LG	\$249.00	DX15F	\$359.00
MX21F	\$1759.00	MX15F	\$439.00
MX17F	\$759		
MX17FG	\$799		



Accura 14.4/Fax-Int/Ext	\$115/\$135
Accura 28.8	\$255
Optima 96	\$309
Optima 14.4+ Fax	\$349
Optima Pocket 14.4	\$289
Optima 28.8 Int/Ext	\$349/\$399
PCMCIA 14.4+ Fax	\$199



Practical Per. 14.4 Int.	\$105
Practical Per. 14.4 Ext.	\$119
28.8 Int/Ext	\$219/\$229
Pro Class 14.4 Int/Ext	\$149/\$159
PCMCIA 14.4	\$265
Pocket 14.4/28.8	\$259/\$369



14.4 w/Fax Int/Ext	\$79/\$99
PCMCIA 24/96	\$89
PCMCIA 14.4/14.4	\$189

SATISFACTION

200 2400 V.42/9600 Fax	\$199
400 14.4/14.4 Fax	\$259
400 Ext. 14.4/9600 Fax	\$289



14.4 Sportster External W/Fax
• V.42/MMP • 5 Year Warranty



Sportster 14.4 Int/Ext	\$109/\$129
Sportster 14.4 Int. Fax	\$115
Sportster 14.4 Ext. Fax	\$135
Sportster 28.8 Int/Ext	\$199/\$219
Terbo 14.4 Dual Std.	\$499
V.32 Terbo Fax	\$369
Worldport PCMCIA 14.4	\$195

MONITORS



FLAT SCREENS

NEC

2V	\$329
3V	\$459
8FGE	\$549
4FGE	\$589
5 FGP	\$1079
5 FGE	\$969
5 FGP	\$1949

CTX

3468A/1451	\$229/\$249
1562/1765 GM	\$319/\$665

MITSUBISHI

Diamond Pro 17 FS	\$919
Diamond Scan 15 FS	\$409
Diamond Pro 21 FS	\$1949

NANAO

F340IW	\$649
F550I/F550IW	\$899/\$979
F560I/F560IW	\$1459/\$1229
F760IW	\$1969
T660I	\$2049

SONY

CPD-1730 17"	\$999
GDM 17SE-1	\$959
GDM 2036S	\$1939

VIEW SONIC

1E/6E	\$279/\$289
15E/VS15EX	\$369/\$399
15/17G	\$419/\$779
17	\$879
20/21	\$1499/\$1679

DRIVES & TAPES

Back Pack 250	\$279
Connor 250 Tape	\$139
Connor 212/540	\$169/\$319
Dual Floppy	\$99
3 1/2" 1.44	\$39

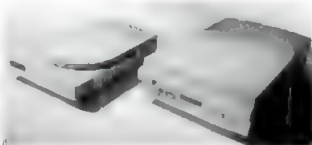
AMERICAN

250/400/450	\$99/\$159/\$189
600/900	\$259/\$359
1250	\$485
Smart 400/600	\$289/\$339
Smart 900/1250	\$469/\$589
Smart 2000	\$1029

SEAGATE HARD DISKS

213 MG 3243A	\$179
341 MG 3391A	\$239
420 MG ST1480A	\$259
452 MG 3491A	\$249
528 MG 3655A	\$329

CD ROM



NEC - TRIPLE SPEED

NEC 3Xe	\$429
NEC 3Xi	\$399
NEC 3Xp/4X Pro	\$379/\$669
Plextor 3028 Int	\$289
Chinon 535 Int/Ext	\$249/\$349
Soundblaster 16 SCSI 2	\$179
Texel 3028 Int/DS	\$289
Texel 5028 Ext/DS	\$329
Texel Quad Speed Int	\$469

VIDEO BOARDS

ATI Mach 32	\$145
ATI Graph Prof 2 MG	\$259
ATI Prof Turbo - 2 MG	\$349
ATI Prof Turbo - 4 MG	\$529
Diamond Stealth Pro	\$219
Diamond Viper 2 MG	\$319
Diamond Stealth 64	\$319
Hercules Dynamite VLB	\$155
Hercules Graphite 2MG	\$369

ARLINGTON COMPUTER PRODUCTS... GREAT SERVICE SINCE 1984!

- PC Magazine "...Arlington offers worry-free mail order purchasing!"
- PC Computing - 1994: "A 10-year track record of consistent service!"
- PC Computing "...Courteous service and terrific technical support!"
- PC Computing Mail Order Review of Peripheral Specialists 8/93. We received the only 5 Star Rating for Price!

Prices and availability subject to change without notice. Qualified purchase orders accepted.

CIRCLE 336 ON READER SERVICE CARD

Hours C.S.T.
7:30-8:30 pm Mon-Fri
9:00-5:00 pm Saturday

1970 Carboy,
Mt. Prospect, IL 60056

NO SURCHARGE FOR CHARGE CARDS!

CUSTOMER SERVICE AND IN ILLINOIS
708-228-6333

SHIPPING
708-228-9748

TECHNICAL ASSISTANCE
708-228-1470

FAX
708-228-0516

Arlington Computer Products, inc.

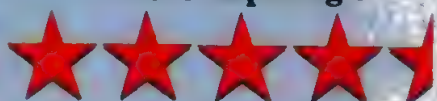
FOR ORDERS & QUOTES:

800-548-5105



**Winner of 22
"Best Buy"
Awards
Including
1993
Hardware
Peripherals
Vendor of the Year!**

PC Computing's



"4 1/2-Star" Rating as Top Direct Vendor

PC Computing's "Direct 60" - July, 1994

Why Buy From USA FLEX?

- 17 Years of Value, Service and Support
- Over 7,000 Items ... Over 300 Top Brand Names
- IBM Authorized Business Partner
- Hewlett-Packard Authorized Dealer
- One-Stop Shopping For Systems, Peripherals, Software
- Same Day Shipping On Most Orders Placed By 5 P.M.
- 24 Hour Sales, Monday Through Friday (9 A.M. to 4 P.M. Sat & Sun)
- Spanish & German-Speaking Sales Consultants
- All Major Credit Cards Accepted
- No Hidden Surcharges
- Affordable Leasing Plans For Qualified Businesses
- Volume Purchase Agreements Available
- 30 Day Money-Back Guarantee On All Flex Systems
- Lifetime Toll-Free Technical Support On Flex Systems
- Extended Warranty Upgrades Available For Most Products
- Discount Rates On FedEx Delivery



Co-Owners
Chuck Wolande Phil Corcoran

IBM® ThinkPad® ThinkPad® 510Cs

IBM ThinkPad 350C Color	
125MB HD, 4MB RAM 2618NOA	\$1599
250MB HD, 4MB RAM 2618POA	\$1999
NEW IBM ThinkPad 360 Mono	
170MB HD, 4MB RAM 262000D	\$1999
NEW IBM ThinkPad 360C Dual Color	
170MB HD, 4MB RAM 262020D	\$2599
NEW IBM ThinkPad 360C Active Color	
170MB HD, 4MB RAM 262010D	\$3499
340MB HD, 4MB RAM 262030F	\$3999
IBM ThinkPad 510 Dual Scan Color	
200MB HD 2604C2U	\$1799



Only
\$1799

Compaq LTE Lite/25E

The Compaq LTE Lite/25E
Features Intel 386SL-25MHz processor,
4MB RAM, 9.5" Active Matrix Mono

LTE Lite	84MB	138000-003	\$949
LTE Lite	125MB	138000-004	\$999

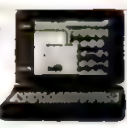
From only
\$949

Now Available
at USA Flex!

**Compaq
Contura AERO**

7.8" Color Display

AERO 4/33C	250MB	199200-004	\$1679
AERO 4/33C	170MB	199200-005	\$1869



Portable PC Power at Affordable Prices!

ActionNote 45LC2-50 Mono

W/24/96 Data/Fax Modem	
180MB A472271	\$1599
ActionNote 500C Pass. Matrix Color	
260MB A476271	\$2019
ActionNote 700	
120MB, 9.5" Mono A478201	\$1679
210MB, 9.5" Mono A478221	\$1869
ActionNote 700C	
210MB, 9.5" Color A479221	\$2279
260MB, 9.5" Color A479231	\$2459
ActionNote 700Cx	
210MB, 8.5" Active Matrix A480221	\$2679
260MB, 9.5" Color A480231	\$2729

NEC

VERSA S/33M 210MB Mono	\$1899
VERSA S/33D 210MB Dual Scan	\$2299
VERSA S/33C 210MB Active	\$3189
VERSA S/50C 260MB Active	\$3649
VERSA V/50C 250MB Dual Scan	\$2799
VERSA V/50C 250MB Active	\$3599
VERSA V/50C 340MB Active	\$3759
VERSA V/50C 540MB Active	\$4229

CANON

NoteJet 486C 486SX-33MHz, with built-in Hi-res. BubbleJet™ printer	
120MB NJ486C-120	\$2129
200MB NJ486C-200	\$2399
NoteJet II 486C 486SLC2-50MHz, with built-in Hi-res. BubbleJet™ printer	
280MB NJ486CII260	\$2599

SHARP

PC-8650-II 200MB HD, 9.4" Active-matrix Color LCD. SH-PC8650-II	\$2799
PC-8660 9.4" Active-matrix Color TFT LCD. SH-PC8660T	\$3495

TOSHIBA

T1910 Mono. 200MB PA1114U-M2A	\$1459
T1910CS 9.5" Color -Dual-scan, 200 MB PA1114U-S2A	\$1999
T1960CS 9.5" Color -Dual-scan, 200 MB PA1170U-S2A	\$2349
320 MB PA1171U-S2A	\$2589
T1960CT 8.4" Color Active 200MB PA1170U-T2A	\$2999
320MB PA1170U-T2A	\$3229
T2400CS 9.5" Color -Dual-scan, 250 MB PA1154U-S2A	\$2879
320 MB PA1155U-S2A	\$3049
T2400CT 8.4" Color Active 250MB PA1154U-T2A	\$3599
320MB PA1155U-T2A	\$3759
T3400 8.4" Mono. PA1119U-M9A	\$1199
T3400CT 7.8" Color Active Matrix PA1121U-T9A	\$3399
T3600CT 8.4" Color Active Matrix PA1119U-T9A	\$3999
T4700CT 9.5" Color Active Matrix 200MB PA1158U-T2A	\$4439
320MB PA1159U-T2A	\$4769
T4800CT Color Active Matrix 500MB PA1161U-T2A	\$5489
T6600C CD-ROM ready PA1609U-X7A	\$6129
T6600C/CD Includes Int. CD-ROM PA1609U-X8A	\$6599

Texas Instruments

TravelMate 4000E WinSX/25	
8.5" Passive Color, 120MB HD 2646692-0001	\$1729
TravelMate 4000E WinDX2/40	
8.2" Advanced Passive Color, 200MB HD 2581375-0001	\$2089
TravelMate 4000E WinDX2/50	
9.4" Dual Scan Color, 200MB HD 2646694-0001	\$2359
TravelMate 4000E WinDX2/50	
8.4" Active Matrix Color, 200MB HD 2581011-0001	\$2859
TravelMate 4000E WinDX4™75	
8.4" Active Matrix Color, 340MB HD 9793050-0001	\$3949
455MB HD 9793050-0019	\$4029
TravelMate 4000E WinDX4™75	
9.4" Active Matrix Color, 455MB HD 9792950-0001	\$4459
TM4000 M Mono 486 SL Enhanced SX/25 MHz, 9.5" Display, 120MB HD, 6.1 lbs. 9792534-0001	\$1849
TM4000 M Advanced Passive Color 486 SL Enhanced SX/25 MHz, 8.2" Display, 120MB HD, 6.4 lbs. 9792532-0001	\$2099
TM4000 M Dual Scan Color 486 DX2/50 MHz, 8.4" Display, 200MB HD, 6.4 lbs. 9798152-0001	\$2779
TM4000 M Active Matrix Color 486 SL Enhanced SX/25 MHz, 8.4" Display, 200MB HD, 6.4 lbs. 9792533-0001	\$2999
TM4000 M Active Matrix Color 486 DX2/50 MHz, 8.4" Display, 340MB HD, 6.4 lbs. 9798153-0001	\$3359
TM4000 M Active Matrix Color 486 DX4/75 MHz, 8.4" Display, 340MB HD, 6.4 lbs. 9794061-0001	\$4959

Modems

BOCA

14.4K W/FAX Int/Ext	\$69*115
14.4K Pocket W/FAX	\$189
14.4K Multimedia Modem	\$119
V.Fast 28.8/14.4/FAX Int/Ext	\$135*165

HAYES

PCMCIA Optima 144+ fax	\$199
Accura 24 + fax/96	\$85
Accura 144+ fax/144 Int./Ext.	\$115*139
Accura 28.8/144 Int./Ext.	\$199*259
Optima 28.8/14.4 Int./Ext.	\$369*379
Optima 144+ fax 144 Int./Ext.	\$369*369
Optima 288 V.FC + fax/144 Int./Ext.	\$359*419

PRACTICAL PERIPHERALS

PCMCIA practiCARD	\$269
14.4/14.4 V.32bis Pocket	\$299
14.4/14.4 V.32bis Int./Ext.	\$109*129
28.8/14.4 V.32bis Int./Ext.	\$229*249
14.4/14.4 V.32bis PS/2 MicroChannel	\$399

144/144 Faxmodem Int./Ext.	\$75*99
SatisFAXtion 400 / 400e	\$279*309

US ROBOTICS

PCMCIA 14.4Fax 14.4 Fax	\$199
Sportster - World Fax Int./Ext.	\$119*139
WorldPort 14.4 Fax/Data pocket	\$229
Courier V.Fast Class 28.8K data/14.4 Fax	CALL

MEGAHERTZ

PCMCIA X-Jack 14.4/14.4	\$199
PCMCIA 14.4/14.4	\$219
PCMCIA Gold Series X-Jack	\$239
PCMCIA Gold Series 14.4	\$239

COMPUTER SOURCE!

NEW

3 Year Warranty
with FLEX xpress parts replacement

Includes Windows

Includes Pentium 64bit Processor

The Ultimate Multimedia Choice!

FLEX PT60

Pentium Multimedia System

All For Only \$2995

Includes Sony/Sound Blaster CD-ROM drive

Includes Hewlett-Packard Color Printer

Includes 8 CD-ROM Titles

COREL CD POWERMAN including:
 Caching Software Speeds up your CD-ROM drive
 System Browser For CD-ROM troubleshooting
 Photo CD Lab Use photo image screen savers & transform photo CD images
 CorelMOSAIC Organize & view graphic and photo files
 CD-Audio Software Record to your hard drive and edit sound clips

*** FLEX PT60 60MHz System**

- Genuine Intel Pentium 60MHz 64bit Processor
- 256K Ultra-fast "Writeback" Cache Memory
- 8MB RAM Maximum 128MB on System Board
- 3.5" (1.44MB) Floppy Drive
- 540MB IDE Hard Drive w/128K Cache
- 15" 28 NI SVGA MultiScan Monitor

*** Hewlett-Packard DeskJet 550C Printer**

*** 24/96 Data/Fax Multimedia Modem**

*** SONY/Sound Blaster CD-ROM Bundle**

- Sony Double-Spin Internal CD-ROM Drive
- Creative Labs Sound Blaster 16 Audio Board
- 8 CD-ROM Discs

*** Microsoft Software and Accessories**

- Microsoft DOS 6.2, Windows for Workgroups 3.11, Works for Windows
- FREE Accessories Kit

Flex Custom Systems

The FLEX Custom Systems offer you top-level performance and reliability in an easily-upgradeable design. And now, USA Flex gives you more features and choices than ever before, all backed by our exclusive 3-Year FlexExpress Warranty. With Flex Custom Systems, you don't have to compromise on specifications, power or price!

Flex Custom Systems

Now Feature

15" SVGA MultiScan Monitors



486 Systems feature

- 486SX, 486SX2 or 486DX2 12bit Processor
- 7 ISA 16 bit slots with 3 VLB 32-bit slots
- 4-64 MB RAM (Max.) • 256K Cache
- 3.5" 1.44MB FD (Dual Drive Optional)
- VLB Video Accel. Card with 1MB RAM
- 24/96 Data/Fax/Voice Multimedia Modem
- Desktop, MidTower (7 Bay) or Full-Tower
- 15" SVGA MultiScan Color Monitor (28mm, 1024x768 Non-Interlaced)
- Enhanced 101 Keyboard • MS Mouse
- MS-DOS 6.22 w/Data Compression
- Windows for WorkGroups 3.11 • MS Works

Pentium Systems feature

- 60 or 90MHz 64bit Pentium Processor
- 3 PCI/5 ISA Slots
- 8 MB RAM (Max. 128MB) • 256K Cache
- 3.5" 1.44MB FD (Dual Drive Optional)
- Video Accelerator Card w/1MB RAM
- 24/96 Data/Fax/Voice Multimedia Modem
- Desktop, MidTower (7 Bay) or Full-Tower
- 15" SVGA MultiScan Color Monitor (28mm, 1024x768 Non-Interlaced)
- Enhanced 101 Keyboard • MS Mouse
- MS-DOS 6.22 w/Data Compression
- Windows for WorkGroups 3.11 • MS Works

Systems above shown with optional cases, Dual Floppy drives, CD-ROM and tape backup units

VL486SX-33 Desktop Case, 4MB, 340MB HD	\$1349
VL486DX2-66 Desktop Case, 4MB, 420MB HD	\$1649
VL486DX2-66 10 Bay Tower, 8MB, 540MB HD	\$1999
PT-60 Pentium CPU, Desktop Case, 8MB, 420MB HD	\$1999
PT-90 Pentium CPU, Tower Case, 8MB, 420MB HD	\$2499

Flex 486 CD Special

\$999

UPGRADABLE 486 SYSTEM:

- 3.5" 1.44MB Floppy Drive
- 210MB 13MS IDE Hard Drive
- VLB Video Accelerator Card
- 14" SVGA Color Monitor
- 101 Key Enhanced Keyboard
- Microsoft Compatible Mouse

Internal CD-ROM Drive
(100ms Access Time 150 KB/sec Transfer)

PLUS A Full Compliment of Software including:
 MS-DOS 6.22, Windows v.3.11, PFS Window Works, F-117A Stealth Fighter, Red Storm Rising, Software Toolworks Interactive Encyclopedia

486SX System
CD-ROM • Monitor
Keyboard • Mouse
Software & Games

3 Year USA FLEX Limited Warranty
on system unit.
Standard manufacturers warranty on all other items. Unlimited Toll-free Technical Support.

IBM® ValuePoints®

64 bit Accelerated S3 Vesa Local Bus video, Supports up to 4 IDE Drives, IBM SurePath™ Flash BIOS, 4 or 8MB RAM (Max. 64MB), VLB SVGA video up to 1280x1024 Res, One 3.5", 1.44MB FD, 101-key keyboard, IBM DOS 6.1, Windows 3.1, 3 year warranty, 24-hour IBM HelpWare

Model	Processor Speed	Hard Drive	RAM Size	Slots	3.5"/5.25" Bays	Video RAM	Flex Part #	Flex Price*
IBM ValuePoint SL SpaceSaver Case, 32 bit Video, non-upgradeable bus								
486SX	25 MHz	212MB	4MB	3/0	2/1	512K	6381F50	\$945
486DX2	66 MHz	212MB	4MB	3/0	2/1	512K	6381W50	\$1690
SL SpaceSaver - 5.25 bays is available								
486SX	33 MHz	270MB	4MB	2/1	2/2	1 MB	6482C1B	\$1385
486DX2	66 MHz	364MB	8MB	2/1	2/1	1 MB	6482L4F	\$2015
IBM ValuePoint Performance Series Desktop - 2.5, 2.5 bays are available								
486SX	33 MHz	270MB	4MB	1/4	3/2	1 MB	6482C1B	\$1445
486DX2	66 MHz	364MB	8MB	1/4	3/2	1 MB	6482L4F	\$2075
IBM ValuePoint Tower - 3.5, 2.5 bays are available								
486DX2	66 MHz	364MB	8MB	1/5	4/2	1 MB	6492L4F	\$2195
IBM ValuePoint Tower								
		Hard Drive/Ave. Access	Standard RAM	Slots/Bays	Flex Part #	Flex Price*		
Pentium P60/D		527MB/8.7ms	8 MB	4x5	6384JA3	\$2430	* Monitor not included	

IBM and HelpWare are registered trademarks and PS/Valuepoint is a trademark of International Business Machines Corporation. Pentium is a trademark, and Intel and the Intel Inside logo are registered trademarks of Intel Corporation. Hewlett-Packard and the Hewlett-Packard logo are registered trademarks of the Hewlett-Packard Corporation.

Mail Order Made Easy! By...

USA FLEX

USA Flex, Inc., 471 Brighton Dr., Bloomingdale, IL 60108

TO ORDER CALL

1-800-333-4515

Federal Express® Delivery Service Available

No Surcharge On These Credit Cards



CIRCLE 051 ON READER SERVICE CARD

Create Your Own Multimedia!

1 Choose Your CD-ROM Drive

FLEX CD-PRO STARTER KIT

\$149
CDPRO1

Double Spin Internal CD-ROM drive with interface card and instructions • 320ms access time • 0KB/sec transfer rate • multi-session Kodak PhotoCD Compatible.

FLEX CD-PRO CLASSIC

\$249
CDPRO3

Sony 2X Spin Int. drive

• 320ms access time • 300KB/sec transfer
Sound Blaster 16 Sound Card
• 16-bit stereo sampling & playback • 20-voice
• ASP & WaveBlaster upgradable. Speakers required.

2 Choose Your CD-ROM Titles

1 Free CD is included with either Kit sold above PLUS Buy any 3 more CD-ROMs for only \$49! (Ask your sales rep for selection of CD-ROM titles.)

3 Choose Your Speakers

Select from models by Sony, Jensen, Labtech, Altec Lansing, Panasonic & more!

Ask your Flex Consultant for Details about this Multimedia Offer

CD-ROM Drives/Multimedia Kits

NEC

MultiSpin 3Xe External.....	\$459
MultiSpin 3Xi Internal.....	\$424
MultiSpin 3Xp Personal.....	\$379
MultiSpin 4X Pro.....	\$699

MITSUMI

Double-Speed CD-ROM Drive.....	\$135
--------------------------------	-------

CHINON

2X Int. CD-ROM Drive.....	\$249
2X Int. CD-ROM Drive w/SCSI IF.....	\$289

TOSHIBA

2X Int. CD-ROM Drive.....	\$319
2X Ext. CD-ROM Drive.....	\$589

SONY

Internal Drive Kit.....	\$139
-------------------------	-------

MEDIAVISION

RENO Portable CD-ROM Disk Player.....	\$299
---------------------------------------	-------

CREATIVE LABS

Creative OmniCD.....	\$179
Omni CD 3X.....	\$349
SB Discovery™ CD 16.....	\$309
SB Edutainment™ CD 16.....	\$409
Game Blaster CD 16.....	\$379
Sound Blaster Multimedia Office.....	\$529
Sound Blaster DigitalEdge 3x.....	\$689
Sound Blaster Value Edition.....	\$59
Sound Blaster Pro Value.....	\$79
Sound Blaster 16 SCSI-2.....	\$169
Sound Blaster 16 MultiCD.....	\$139
Sound Blaster AWE32.....	\$269
Wave Blaster.....	\$175
VoiceAssist.....	\$55

TURTLE BEACH

WAVE™ 2.0.....	\$73
Maui Wavetable Synthesizer.....	\$155
MultiSound Monterey™ MM.....	\$349
Rio Waveblaster™ compatible Synthesizer.....	\$149

ORCHID

SOUND WAVE 32.....	\$169
GAMEWAVE 32.....	\$109

NEW!



CTX

Your Ideal Display Solutions!



MPR II

Monitors and Video!

NEC Special Pricing

Demo/Showroom/
Factory-Reconditioned Models
Includes 1 Year Warranty

3FGe 15" .28mm.....	\$439
4FGe 15" .28mm.....	\$529
5FGe 17" .28mm.....	\$699
6FGe 21" .28mm.....	\$1299



Limited Quantity

NEW!

Hercules Stingray

Fast & Powerful Graphics Accelerator for Windows, OS/2 and Windows NT.



Hercules quality, performance and support at a great price!

\$99
STINGRAYVL-I

NEC

14" SVGA.....	\$309
14" 2V.....	\$329
15" 3V.....	\$469
15" 3FGe.....	\$557
15" 4FGe.....	\$617
17" 5FGe.....	\$998
17" 5FGp.....	\$1094
21" 6FGp.....	\$1998

CTX

14" .39mm.....	\$199
14" .28mm.....	\$239
14" .28mm E Star & MPR-II.....	\$245/\$269
14" .28NI E Star & MPR-II.....	\$289/\$295
15" .28mm.....	\$319
15" .28NI E Star & MPR-II.....	\$339
17" .28 NI.....	\$649

14" LX1450LG.....	\$269
15" DX15F.....	\$369
15" MX15F-L.....	\$479
17" DX17F.....	\$669
17" MX17F-L.....	\$899
21" MX21FG.....	\$1799

SONY

15" CPD-15SF.....	\$459
17" GDM-17SE1.....	\$999
20" GDM2036S.....	\$1849
20" GDM-20SE1.....	\$1949

MAGNAVOX

14" Paper White Mono VGA.....	\$109
14" M2089.....	\$239
14" M2099.....	\$259
15" CM2015.....	\$299
15" CM4015.....	\$369
17" CM4017.....	\$649
17" CM4018.....	\$679
20" 20CM64.....	\$1039

NOKIA

14" D1-44BS.....	\$399
15" D1-449E.....	\$499
17" D1-447B.....	\$899
21" D1-445M.....	\$1929

ATI Technology

GRAPHICS ULTRA+ 2MB.....	\$209
GRAPHICS ULTRA™.....	
PRO 2MB ISA.....	\$279
GRAPHICS ULTRA™.....	
PRO 2MB VLB.....	\$279

SPEEDSTAR PRO ISA 1MB.....	\$89
SPEEDSTAR 64 w/Corel Draw 3.0 ISA/PCI 1MB/2MB.....	\$149/\$195
STEALTH 32-1MB.....	\$165
STEALTH 32-2MB.....	\$209
STEALTH 64-2MB.....	\$379
STEALTH 64-4MB.....	\$469
VIPER 2MB VLB.....	\$339
VIPER 2MB PCI.....	\$349

ORCHID

KELVIN 64 1MB ISA/VLB/PCI.....	\$149
KELVIN 64 2MB ISA/VLB/PCI.....	\$199

HERCULES

Stingray VLB 1MB.....	\$99
Stingray PCI 1MB.....	\$99
Dynamite Pro ISA 2MB.....	\$199
Dynamite Pro VLB 2MB.....	\$199
Dynamite Power 2MB VLB.....	\$209
Dynamite Power 2MB PCI.....	\$209
Graphite Power ISA 1MB.....	\$229
Graphite Power ISA 2MB.....	\$349
Graphite Power VLB 1MB.....	\$199
Graphite Power VLB 2MB.....	\$289
Graphite Terminator 64 VLB/PCI 2MB & 4MB.....	CALL

Video Capture Boards

ORCHID

Videola.....	\$359
--------------	-------

AOS

Video Clipper.....	\$315
PC Prime Time.....	\$325
VGA-TV Elite Int./Ext.....	\$129/\$199
TV Elite A/V.....	\$179

AI Tech

MultiPro CTV.....	\$279
ProPC/TV Plus.....	\$149
Wavewatcher TV.....	\$329

Call today for our complete catalog of over 10,000 Name Brand items at affordable prices!

Mail Order Made Easy! By...

USA FLEX

USA Flex, Inc., 471 Brighton Dr., Bloomingdale, IL 60108

Code # PM10B4

TO ORDER CALL...

1-800-766-1940

Federal Express® Delivery Service Available

No Surcharge On These Credit Cards



PERIPHERAL PARTNER!

Canon

Canon BJC-600 Bubble Jet Printer™

NEW
Lower Price
Now Only...

\$499

BI-BJ600

- 360 dpi • 60KB buffer • 7 fonts • 340 cps
- Parallel I/F • Narrow carriage
- 9.9 lbs. • 64-nozzle x 4 print heads
- 100-sht. sheet feeder

LEXMARK



ValueWriter 600 Printer

- 600 dpi quality for outstanding text and graphics
- 5 pages per minute
- 1MB exp. to 5MB
- 27 fonts
- 1 Year LexExpress Warranty

ExecJet IIc

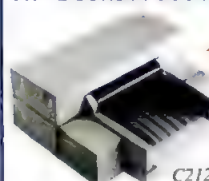
- Outstanding Color Printing
- 2 to 7 minutes per color page
- 600x300 dpi w/PQET
- 12 scalable fonts 2 bitmapped fonts
- 2 Year LexExpress Warranty

CALL YOUR FLEX REP FOR PRICE DETAILS



HEWLETT® PACKARD

HP DeskJet 550C Printer



**MANAGERS
SPECIAL**

Order Now!
Quantities Limited!

**Only...
\$429**

- 300 dots per inch
- Up to 16.7 million colors
- Feeds up to 100 sheets
- Perfect for windows users
- 3 Year Warranty

Black Print Cartridge 51626A '25
Tricolor Print Cartridge 51625A '29
3 Year Support Pack H5462A '80

USA Flex...Your Source for Name Brand Printers!

CANON

BUBBLE JET PRINTERS

BJ-10SX / 200e / 230	.. '245 / '284 / '389
BJ-100	.. '229
BJC-600	.. '499
BJC-4000	.. '499
LBP-430 / 860	.. '579 / '1099

LEXMARK

NEW Lexmark WinWriter Series

Model 100/200	.. '283 / '489
Model 400/600	.. '768 / '999
ValueWriter 300	.. '849
ValueWriter 600	.. '829
ExecJet II/ExecJet IIc	.. '279 / '329

IBM 2390/2391 Plus

Dot Matrix Printer	.. '309 / '430
--------------------	----------------

IBM Color Jet Printer PS 4079

Dot Matrix Printer	.. '329 / '430
--------------------	----------------

IBM Color Jet Printer PS 4079

Dot Matrix Printer	.. '249
--------------------	---------

Laser Printers

4039 10R	.. '1275
4039 10D	.. '1745
4039 12R plus	.. '1395
4039 12L plus	.. '1845
4039 16L plus	.. '2695
4029 LaserPrinter 6	.. '940
4029 LaserPrinter 10	.. '1129

TEXAS INSTRUMENTS

New microLaser Pro 600 Laser Printer

PS23	.. '1189
PS65	.. '1529
microLaser Pro E	.. '1369
microLaser Power Pro	.. '1639
microWriter Printer	.. '509
microWriter PostScript® Printers	
PS23	.. '629
PS65	.. '799
microMarc™ Inkjet Printer	.. '229
microMarc™ COLOR Inkjet Printer	.. '379

HP PRINTERS

HP DeskJet 520 - New 500 DPI	.. '285
HP DeskJet 500C - Color	.. '345
HP DeskJet 550C - Color	.. '429
HP DeskJet 560C - New Color	.. '589
HP DeskJet 1200C - Color	.. '1349
HP DeskJet 1200C - Color PS	.. '1699
HP DeskJet 310 - Portable	.. '289
HP LaserJet 4L - New at Flex	.. '689
HP LaserJet 4P - New at Flex	.. '949

*Price includes \$50 Rebate

SHARP

JX-9400 Laser Printer	.. '399
JX-9460PS Laser Printer	.. '949
JX-9660PS Laser Printer	.. '1349

OKIDATA PRINTERS

OL410E	.. '849
OL400E	.. '489
Microline® Series	
Narrow BI-ML320-I	.. '299
Wide BI-ML321-I	.. '429
Narrow BI-ML590-I	.. '424
Wide BI-ML591-I	.. '684

PANASONIC PRINTERS

Laser Printers

KX-P4400	.. '399*
KX-P5400	.. '699*
KX-P4410	.. '489
KX-P4430	.. '699
KX-P4440	.. '989

Dot Matrix Printers

KX-P1150	.. '129
KX-P2023	.. '179
KX-P3123	.. '249
KX-P2124	.. '309
KX-P3124	.. '319
KX-P2130	.. '169*
KX-P2135	.. '195*
KX-P1624	.. '369
KX-P3624	.. '399

*Price includes Manufacturer Rebate

LASER PRINTERS

ACTION Laser 1100	.. '479
ACTION Laser 1500	.. '599
ACTION Laser1600	.. '944

DOT MATRIX PRINTERS

AP 2250	.. '124
LP300	.. '164
AP 3250	.. '162
AP 3260	.. '179
LQ-570+	.. '239
FX-870	.. '268
FX-1170	.. '349
LQ-1070+	.. '364
LQ-870	.. '439
LQ-1170	.. '598
LQ-2550 Cir.	.. '899
DFX-5000+	.. '1319
DFX-8000	.. '2249
Stylus 300	.. '189
Stylus 400	.. '199
Stylus 800+	.. '244
Stylus 1000	.. '439
Stylus Color	.. '558

DIGITAL

DECWRITER 65	.. '179
DECColorwriter	.. '399
DECclasser 1152	.. '699
DECclasser 5100	.. '1499



- Memory Modules
- Expansion Boards
- Laser Printer Memory and More!

**Lifetime
Warranty**

USA Flex carries a full line of
quality Viking memory for most printers,
notebooks and desktop systems.

Ask your Flex Sales Representative for details.

NOVELL

NetWare 3.12 (3.5" Disks)

5 user	.. '579
10 user	.. '1299
25 user	.. '1899
50 user	.. '2579
100 user	.. '3699

NetWare 4.01 (CD-ROM)

5 user NV-4.01-SCD	.. '799
10 user NV-4.01-10CD	.. '1649
25 user NV-4.01-25CD	.. '2749
50 user NV-4.01-50CD	.. '3649

NOVELL DOS 7 W/ Personal NetWare

	.. '69
--	--------

COLORADO

Jumbo 250 Int/Ext.	.. '189 / '249
Jumbo Tracker 250MB	.. '289
PowerTape™	
1100 Int (525MB)	.. '889
2400 Int/Ext. (1.2MB)	.. '799 / '1079
4000 Int/Ext. (2.0MB)	.. '1189 / '1389
PowerDAT8000	
Int/Ext. (4.0MB)	.. '1189 / '1389

MICRODYNE

NE2000plus	.. '79
NE2000Tplus	.. '69
NE2000plus-3	.. '89
NE3200	.. '399
NE3200T	.. '399

TRIPP LITE POWER PROTECTION

NEW ISOBAR® MasterTouch Console	.. '59
NEW ISOBAR® MasterTouch Plus	.. '79
ISOBAR® Command Console Plus	.. '89
ISOBAR® Command Console Compact	.. '45
ISOBAR® Surge Suppressors	
Isobar 4/Isobar 6/Isobar 8	.. '39 / '49 / '55
DataShield S100 Surge Suppressors	.. '59
Standby UPS/BC 250 / 400	.. '99 / '159
500	.. '189
Standby UPS BC-LAN	
400 / 500 / 600	.. '169 / '199 / '249
750 / 900	.. '299 / '349
ISOBAR® Ultra Surge Suppressors	
Isobar Ultra 4 / 6 / 8	.. '45 / '52 / '59
ISOTEL® Ultra Surge Suppressors	
Isotel Ultra 6 / 8	.. '64 / '74
Super 7 Surge Suppressor and	
Noise Filter	.. '19
Power Miser	.. '82

ORDER INFORMATION: Minimum shipping and handling per order \$11.95. MasterCard, Visa and Discover accepted for USA, Canada, APO, FPO and Puerto Rico. FLEXCARD accepted for continental USA only. A \$10 surcharge on credit card orders for APO, FPO and Puerto Rico. C.O.D. order under \$800.00, add \$5.00; over \$800.00, add \$10.00 check/wire transfer charges. Call for special UPS FedEx/C.O.D. rates. APO/FPO, add 5% to cover additional shipping and handling. Call for PAL rates. CORPORATE/GOVERNMENT ORDERS: Corporations must pay in advance and payment processing accepted on Net 30 terms with receipt of a valid purchase order. Delivery times available for qualified customers only. RETURN POLICY INFORMATION: All items must have prior authorization from our Customer Service Department (1-800-885-1999 or 1-708-351-7172 Mon. - Fri. 7:30 a.m. to 6 p.m. & Sat. 9 a.m. to 2 p.m. CT). All returns must be in as-shipped condition, with original packaging, including all warranty cards and manuals. Product Returns may be subject to a restocking charge. We will only accept returns on unopened and non-demonstrated software. Software compatibility guaranteed only if we have downloaded it on your new FLEX system. Thirty (30) day money back guarantee applies to FLEX system only (does not include printers or other non-installed peripherals). We will not accept returns on laser printers if laser cartridge has been installed. All prices and specifications subject to change, without notice. We reserve the right to change prices at any time. All trademarks and registered trademarks are of their respective owners. ©1994 USA Flex, Inc.

(708) 582-6206 • FAX (708) 351-7204
Gov. 1-800-723-2260/Educ. 1-800-944-5588
Gov/Educ FAX (708) 351-9871
Habla Espanol 1-800-723-5500 • (708) 582-6142
Verhandlungen in Deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr)
(Midnight to 9:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 6:00 p.m. Mon-Fri,
Sat. 9 a.m. - 2 p.m. CT)

USA FLEX
1-800-766-1940

OPEN 24 HOURS Mon - Fri
9 A.M. - 4 P.M. Sat & Sun

Code # PM10B4

IBM

COMPAQ

NEC

TOSHIBA



#1

FLORIDA'S LARGEST AUTHORIZED DEALER FOR NOTEBOOK COMPUTERS

DIRECT!!

TOSHIBA

T3600 Portege
AUTHORIZED DEALER

- T3400 Mono.....\$1179
- T3400 CT Active 120HD.....\$2199
- T3400 CT 250HD.....\$3200
- T3600 CT.....CALL

ALL MODELS IN STOCK

TOSHIBA

T1910/T1960CT
AUTHORIZED DEALER

- T 1910 Mono 200.....\$1479
- T1910CS 200 COLOR.....\$1999
- T1960CS 200 COLOR.....\$2399
- T1960CT 200.....\$2999
- T1960CT 320.....\$3299

ALL MODELS IN STOCK

TOSHIBA

T4700CT / T4800CT
AUTHORIZED DEALER

- T4700CT / 200 Active Color
- T4700CT / 320 Active Color
- T4800CT / 510 Active Color

ALL MODELS IN STOCK

CALL FOR BEST PRICE

NEW!

TOSHIBA

T 2400CT

- T2400CS DX50 4/250 DUAL.....\$2949
- T2400CT / 4/250.....\$3675
- DX50 4 / 320 ACTIVE.....\$3849

ALL MODELS IN STOCK

NEW!

COMPAQ

CONTURA AERO
AUTHORIZED DEALER

- 486/25 Mono 170.....\$1129
- 486/33 COLOR 170.....\$1669
- 486/33 COLOR/250.....\$1869

ALL MODELS IN STOCK

NEW!

COMPAQ

LTE ELITE 486/40.50.75 MHz
AUTHORIZED DEALER

- 486DX40/50/75 MHz • 340 MEG HD
- 170 MEG HD • 510 MEG HD
- VGA ACTIVE MATRIX COLOR

CALL FOR BEST PRICE

ALL MODELS IN STOCK

EPSON

ACTION NOTE 700 486DX/33

- 700.....120 MEG.....\$1625
- 700.....210 MEG.....\$1799
- 700C.....120 MEG.....\$1969
- 700C.....210 MEG.....\$2219
- 700C.....260 MEG.....\$2250
- 700CX.....120 MEG Active.....\$2350
- 700CX.....260 MEG Active.....\$2699
- NEW 750 SERIES.....CALL

ALL MODELS IN STOCK

NEC

NEW VERSA

SERIES

AUTHORIZED DEALER

- NEC VERSA S
- 486 SLD33 210 MONO.....\$1850
- 486 SLD33 250 DSTN COLOR.....\$2279
- 486 SLD33 210 ACTIVE.....\$3185
- 486SLD50 260 ACTIVE.....\$3649
- NEC VERSA V
- 486 SLD50 250 DSTN COLOR.....\$2799
- 486SLD50 250 TFT COLOR.....\$3585
- 486SLD50 340 TFT COLOR.....\$3750
- 486SLD50 540 TFT COLOR.....\$4249
- NEC VERSA M
- DX4 75MHz/100MHz Active units, 8 MB

ALL MODELS IN STOCK

HIGH END
NETWORK SERVERS

IBM

AST

NEC

COMPAQ
PROLIANT1000R • 2000R
4000R

ALL SERVERS IN STOCK

AST

ASCENTIA 800N AVAILABLE

ASCENTIA 300N
AUTHORIZED DEALER

- DX50 4/250 Dual.....\$2899
- DX50 4/340 Dual.....\$3249
- DX50 8/340 Active.....\$4749
- DX75 8/340 Dual.....\$3879
- DX75 8/510 Active.....\$5799

ALL MODELS IN STOCK

TEXAS INSTRUMENTS

MULTI MEDIA TRAVELMATE TM 4000M

- SX/25 Mono.....\$1865
- SX/25 Color/120HD.....\$2119
- SX/25 Active Color/200 HD.....\$2969
- DX4/75 Active Color/340 HD.....\$4999
- DX4/100.....CALL

ALL MODELS IN STOCK

IBM

THINKPAD 360

- 360 MONO.....CALL
- 360CS COLOR.....CALL
- 360C ACTIVE COLOR.....CALL
- 510 MONO/COLOR.....CALL

ALL MODELS IN STOCK

NEW!

IBM

THINKPAD 755C

- 755CS COLOR
- 755C ACTIVE COLOR
- ALL IN STOCK

CALL FOR BEST PRICE



HEWLETT

PACKARD

Authorized Dealer

- HP 4L.....\$649
- HP4P.....\$929
- HP 4ML.....\$969
- HP 540.....CALL
- HP4MP.....\$1299
- HP 200LX 1MB.....\$499
- HP 200LX 2MB.....\$629
- HP 1200C.....\$1299
- HP 1200CPS.....\$1879



- HP560C.....\$544
- HP Fax 950.....\$927
- HP Fax 700.....CALL
- HP Deskjet 320.....\$299
- HP Scanjet 2CX.....\$949
- HP Scanjet 3P.....CALL
- HP Omnibook 530.....CALL

ALL MODELS IN STOCK

22191 POWERLINE RD., SUITE 14B, BOCA RATON, FL 33433

FOR TECH SUPPORT &
CUSTOMER SERVICE

(407) 394-3742

FAX YOUR ORDER

(407) 750-4261

OUTSIDE USA

(407) 394-4180

- TECH HOURS: MON-FRI 9-6; SAT 10-4
- COMPANY & GOVERNMENT PURCHASE ORDERS WELCOME
- NO CREDIT CARD SURCHARGE
- WE ACCEPT VISA, MASTERCARD, DISCOVER & AMERICAN EXPRESS
- WE ARE OPEN MON-FRI 9AM-8PM; SATURDAY 10 AM-6 PM; CLOSED SUNDAYS

SUNSHINE
COMPUTERS

CIRCLE 081 ON READER SERVICE CARD

ATTENTION: Due to On-going Price Updates of Notebook & Laptop Computers CALL for current Pricing & Availability

THE FOLLOWING ALSO APPLIES:

- ALL ITEMS CARRY A ONE YEAR WARRANTY.
- 15-DAY RETURN POLICY
- ALL ITEMS RETURNED MUST INCLUDE ORIGINAL PACKAGING AND DOCUMENTATION.
- NO RETURNS WITHOUT RMA NUMBER

- SHIPPING AND HANDLING NON- REFUNDABLE
- ALL RETURNS SUBJECT TO A RE-STOCKING FEE
- NOT RESPONSIBLE FOR TYPOGRAPHICAL ERRORS
- SOFTWARE NOT RETURNABLE
- LASER PRINTERS NOT RETURNABLE

1-800-413-5854

WHEN IN FLORIDA VISIT OUR 5000 SQ. FT. SHOWROOM

COMPUTERS

Packard Bell

486SX/25 4/210MB Multimedia	\$999
486SX/50 4/340MB Multimedia	1275
486DX/50 4/810MB Multimedia MT	1575
486DX/66 4/420MB Multimedia	1475
486DX/66 8/540MB Multimedia	1675
486DX/66 8/810MB Multimedia TBU	1975
Pentium/60 8/420MB Multimedia	2075
Pentium/90 8/540MB Multimedia	2475
Pentium/90 8/810MB Multimedia MT	2599

AST

Bravo 486DX/2-66 270HD	\$1750
Bravo 486DX/2-66 340MB CD	2299
Bravo 486DX/4-100 270MB	2284
Bravo 486DX/4-100 540MB	2549
Bravo 486SX/33 170MB	1158
Bravo 486SX/50 170MB	1299
Bravo MT/60 Pentium 540MB CD	2999
Bravo MT/60 Pentium 270MB	2135
Premiere 486DX/33 340MB	2199

Call ValueLine for all AST notebooks and desktops

Canon

NoteJet 4/33 120HD	
with built-in printer	\$1899
NoteJet 4/33 200HD	
with built-in printer	1999
NoteJet 486SX/25 260HD	
with built-in printer	2095

TEXAS INSTRUMENTS

TM4000E DX/2 200HD Mono	\$2525
TM4000E SX/25 120HD Mono	1748
TM4000E DX/50 200HD Color	3250
TM4000E SX/25 120HD Color	2299
TM4000E DX/75 340HD Color	4399



PS/1 486SX/33 253HD	\$1199
PS/1 486DX/50 420HD CD	1549
PS/1 486DX/50 340 Mini	1149
ValuePoint 486DX/33 4120	1249
ValuePoint 486DX/33 4212	1299
ValuePoint 486DX/66 120MB	1675
ValuePoint 486DX/66 212MB	1725
ThinkPad 350 Color 125MB	1549
ThinkPad 350 Color 250MB	1899
ThinkPad 360 Mono 170MB	1899
ThinkPad 360 Color 170MB	2499
ThinkPad 500 S/C2/50 85MB	799
ThinkPad 500 S/C2/50 170MB	999

Over \$1,000,000 of IBM in Stock

MEMORY UPGRADES

VALUELINE STOCKS VIKING & KINGSTON
MEMORY FOR MOST COMPUTERS.
PRICES CHANGE, SO CALL US FOR
YOUR BEST PRICE!

PRINTERS

OKIDATA

ML184 Turbo	\$219	ML321	\$419
ML380	210	ML521	485
ML320E	295	OL400E	495
ML520	363	ML591	569
ML590	419	OL410E	649
		OKI393LE	999

Panasonic

2023	\$179	4410 Laser	\$499
4400 LED	449	2624	399
2130	209	3123	249
1654	599	3124	329
2124	315	3624	409
1150	139		

Canon

BJ230	\$399	430 Laser	\$575
BJ200E	285	BJ105X	249
BJC600	365		



4037 SE LED Printer	\$649
4039 Laser Model 16L Plus	2699
4039 Laser Model 12R Plus	1499
4039 PostScript 10RD	1799
4039 PostScript 10RD	1299
4076 ExecJet II Ink Printer	275

VGA BOARDS

ATI Graphics Ultra Pro EISA 2MB	\$389
ATI Graphics Ultra + 2MB	235
Hercules D301 Dynamite Pro ISA	\$164
Hercules D302 Dynamite Pro ISA	226
BOCA Super VGA with 12K	369
BOCA Super Accelerator with 1MB	119
BOCA Voyager Local Bus	129
BOCA Vortek VRAM with 2MB 16-bit	199

VALUELINE

WHERE MORE THAN JUST THE PRICE IS RIGHT

- Your Source for Hewlett-Packard, IBM, Toshiba and AST
- Certified Repair Services Department Authorized on Most National Branded Products
- \$30,000,000 Inventory With Thousands of Software Titles In Stock

CALL TOLL-FREE
1-800-700-1000

Monday-Friday 8:30am to 6:00pm

IN ILLINOIS 24-HOUR FAX LINE
(708) 933-1100 • 1-800-677-7168

BIG SAVINGS • SUPER SELECTION • GREAT SERVICE



In Touch with Tomorrow TOSHIBA

T1910/200	\$1485
T1910C/200	2025
T1960CS/200	2415
T1960CT/200	2999
T1960CT/320	3342
T4700CS/200	3108
T4700CS/320	3348
T4700CT/200	4565
T4700CT/320	4849
T4800CT/500	5475
T6600CD	6544



LaserJet 4P	\$938
LaserJet 4ML for MACs	969
LaserJet 4MP for MACs	1325

PRINTERS

HEWLETT PACKARD

DeskJet 520	\$289
DeskJet 500C Color	345
DeskJet 560C Color	559
DeskWriter 520	289
DeskWriter C Color Printer for MACs	349
DeskWriter 550C Color Pro for MACs	399
DeskWriter 560C Color Pro for MACs	599
DeskJet 310 Portable for IBMs	295
DeskWriter 310 Portable for MACs	299

EPSON

LC300	\$169	AP2250	\$125
FX870	269	AP3250	159
FX1170	355	AP3260	179
LQ1070+	369	DFX5000+	1313
LQ570+	239	DFX8000	2209
LQ870	449	Stylus 800	249
LQ2550	899	Laser 1500	639
LQ1170	599		

BATTERY BACK-UPS

3M

BACK UP 250	\$95	SMART 400	\$289
BACK UP 400	154	SMART 600	339
BACK UP 450	185	SMART 900	499
BACK UP 600	259	SMART 900XL	799
BACK UP 900	359	SMART 1250	619
BACK UP 1250	485	SMART 2000	1029

Seagate

BC 250	\$92	SMART 250	\$219
BC 400	144	SMART 400	259
BC 500	175	SMART 500	279
BC 500 LAN	179	SMART 600	299
BC 600 LAN	229	SMART 750	399
BC 750 LAN	275	SMART 900	455
BC 900 LAN	319	SMART 1250	565
BC 1250 LAN	439		

HARD DRIVES

Seagate

ST3243A 214MB 3.5" IDE	\$189
ST3391A 341MB 3.5" IDE	239
ST3491A 428MB 3.5" IDE	259
ST3655A 545MB 3.5" IDE	349
ST31200N 1.05GB SCSI2	729

Maxtor

7171A 172MB IDE 3.5"	\$199
7273A 273MB IDE 3.5"	269
7345A 340MB IDE 3.5"	249
7346A 340MB IDE 3.5"	349

HARD DRIVES/CONTROLLERS

CONNER

Conner 420MB 3.5" IDE	\$245
Conner 540MB 3.5" IDE	345
Conner 810MB 3.5" IDE	485
Conner 1.08GB 3.5" IDE	599

BUDE

BOCA IDE & I/O Controller	\$49
IDE Controller	29
IDE Controller with I/O	39

MULTIMEDIA

REVEAL

MF801 Kit	\$275
MF808 Kit	599

CREATIVE

Sound Blaster Value	\$59
Sound Blaster Pro Value	79
Sound Blaster 16 Basic Value	99
Sound Blaster ACD 16	149
Sound Blaster SCSI 16	169
Sound Blaster MCD ASP 16	179
Sound Blaster SCSI ASP 16	199
Game Blaster CD 16 Kit	375
Multimedia Office	519

Monterey

Crescendo Sound System	\$329
Rio Sound System	349
Musi WaveTable	129
	159

Labtec

Labtec CS 150 Speakers	\$17
Labtec SS 700 Speakers	36
Labtec CS 550 Speakers	25
Labtec CS 1000 Speakers	59
Labtec CS 1400 Speakers	99
Labtec CS 800 Speakers	39
Labtec CS 900 Speakers	69

ACS 50 Speakers	\$65
ACS 300 Speakers	235

CD-ROM

NEC-CDR 400 3XP Triple Speed	\$419
NEC-CDR 500 3XB Triple Speed	439
NEC-CDR 600 3XE Triple Speed	499
Toshiba XM3401E	375
Toshiba XM3401B	299
Microalgorithms DB Speed External	
CD-ROM Drive	379

CD-ROM

CHINON

CD5535 Int. D8 Speed with SCSI I/F	\$339
CD5535 Ext. D8 Speed with SCSI I/F	429

FAX MACHINES

Canon Fax 16	\$269
Sharp UX-184 with Cutter	289
Sharp UX-254 with Cutter, Digital TAD	349
Canon Fax 8140 Plain Paper w/P&P: I/F	799
Canon Fax 8160 Plain Paper w/P&P: I/F	899
Hewlett-Packard Fax 900 InkJet	765
Hewlett-Packard Fax 950	965

MODEMS & COMMUNICATIONS

Robotics

14.4 External Sportster	\$124
14.4 External Sportster/Fax	139
14.4 Internal Sportster	115
14.4 Internal Sportster/Fax	119
Worldport 14.4 PCMCIA 2	199
Worldport 9600 V.32	210
Courier 28.8 V.34 Internal	385
Courier 28.8 V.34 External	415

PRINCE

14.4 Internal V.42bis with Fax	\$105
14.4 External V.42bis with Fax	125
28.8 External with Fax	259
28.4 Internal with Fax	239

Hayes

ACCURA 14.4 + Fax 144 Internal	\$145
ACCURA 14.4 + Fax 144 External	155
ACCURA 28.8 External	299

3COM

28.800bps Internal Fax/Modem	\$199
28.800bps External Fax/Modem	229

intel

SoftFAXtion Modem	
100 Internal	\$94
400 Internal	268
400 External	305

Megahertz

24/96 PCMCIA Send/Receive Fax	\$99
24/96 X-Jack PCMCIA	
Send/Receive V.42	99
14.4 X-Jack PCMCIA V.42	229
14.4 PCMCIA Send/Receive Fax	229
14.4 PCMCIA X-Jack V.42	
with Flash ROM	249
14.4 for Compaq Internal V.42 bis	395
96/96 for Compaq Send/Receive V.42	375

VGA MONITORS/TERMINALS

NEC

NEC 14" SVGA 28DP	\$349
NEC Multisync 3FCe	599
NEC Multisync 5FCe	999
NEC Multisync 4FCe	645

SONY

Sony 155F 15" Multisync	\$469
Sony 175E 17" VGA	999
Sony 20" Multisync MDL 2036	1985

LEADING EDGE

Leading Edge 14" EVGA 39DP	\$189
----------------------------	-------

Packard Bell

Packard Bell 14" SVGA 39DP	\$217
Packard Bell 14" EVGA 28DP NI	265
Packard Bell 15" SVGA 28DP NI	352
Panasonic 14" SVGA 28DP	329

WYSE

WYSE 30 Amber or Green	\$274
WYSE 55 Amber or Green	349
WYSE 60 Amber, Green or White	374
WYSE 150 Amber, Green or White	346
WYSE 160 Amber, Green or White	407
WYSE 185 Amber, Green or White	319
WYSE 325 Color	349
WYSE 370 Color	899

TAPE BACK-UP & MEDIA

OLAND

JUMBO 120	\$95
JUMBO 250	169
TRAKKER 250MB Portable	325
Powertape 1.0GB Internal	599
Powertape 2.0GB Internal	919
Powertape 2.0GB External	1049

MEGA

BERNOULLI PC Powered 90	\$325
BERNOULLI PC Powered 150	469
250MB Tape Back-Up Internal	165

SyDos

SyDos 270MB Int. Cartridge Drive	\$469
SyDos Martin 105MB Int. IDE	289
SyDos 88MB Ext. SCSI	439
SyDos 88MB Int. SCSI	389

3M

3.5" Diskettes DSHD Fmt	\$7
5.25" Diskettes DSHD Fmt	5
DC 2120	12
DC 2120 X/MAT	14
DC 600A	14
DC 6150	13
DC 6250	17
MAGNUS I 0	32
MAGNUS I 2	35

NETWORKING

ValueLine has CNE's on staff,
buy with confidence.

NOVELL

NetWare Version 3.12	
5 User 3.5" . \$609	50 User 3.5" \$2749
10 User 3.5" 1389	100 User 3.5" 3799
25 User 3.5" .1999	
SPECIAL PRICING ON UPGRADES Call for details CALL	
NetWare Version 4.02 on CD-ROM	
5 User\$779	50 User\$3499
10 User1779	100 User 4899
25 User2519	250 User 8729

WESTERN DIGITAL
420MB IDE 128K
Cache, 13ms
Hard Drive
\$219

Hard Drives

170-250MB

Seacate

250-350MB

Seagate

Maxtor

Maxtor

Maxtor

Seagate

Western Digital

NEC

Maxtor

Maxtor

Maxtor

Western Digital

Seagate



Quantum

Seagate

Sound

Sound Cards	
Diamond Sonic 16 LX Sound Card SONIX	\$89
Diamond Sonic 16 Bit Sound Card SONIX	189
Media Vision Pro Audio Studio 16 SONIX	115
Media Vision Pro Audio Spectrum 16 Bit Sound Card PROSPEC	95
Media Vision Pro Audio Spectrum 16 Bit Sound Card SPECTRUM	99
Creative Labs Sound Blaster 16 SEBASTAS	99
Creative Labs Sound Blaster 16 SCS2 SB16	139
Creative Labs Sound Blaster 16 ASP SB16SP	195
Creative Labs Sound Blaster AWE32 AWB3	269

MON

Viewsonic	v8E 14" 1024x68 Non-Interlaced	15"	\$689
Viewsonic	V15E 15" 1280x1024 NEW ENERGY STAR!	Y15E	\$369
Viewsonic	V15EX 15" 1280x1024 NEW ENERGY STAR!	V15EX	\$399
Viewsonic	V15 15" 1280x1024 76Hz Refresh Rate 1024x68		\$429
Viewsonic	V15E 15" 1280x1024 NEW ENERGY STAR!	Y15E	\$469
Viewsonic	V17G 17" 1280x1024 NEW SUGA VENTAGE	VIEW17E	\$799
Viewsonic	V17 17" 1280x1024 Non Interlaced		\$899
Viewsonic	20" 1600x1280 User Programmable Modes VIEW20		\$1499
Viewsonic	20" 1600x1280 User Programmable Modes VIEW20		\$1699
MAG.	V15 15" 1280x1024 SUGA NEW ENERGY STAR!	VIEW15	\$399

Sound Cards

MONITORS

Viewsonic	v6E 14 1024x 60 Non-tilt 16:10	1569
Viewsonic	V15E 15 1280x1024 NEW ENERGY STAR!	\$369
Viewsonic	V15EX 15 1280x1024 NEW ENERGY STAR!	\$399
Viewsonic	V5 1280x1024 60Hz Refresh 6:523x68	\$425
Viewsonic	17E 17 1280x1024 NEW ENERGY STAR!	\$465
Viewsonic	17G 17 Green 1500x1280 SVGA ViewiTG	\$799
Viewsonic	17 1280x 1024 Non-Tilt 16:10	\$889
Viewsonic	20 1600x1280 User Programmable Modes ViewiTG	\$1499
Viewsonic	20 1600x1280 User Programmable Modes ViewiTG	\$1699
MAG	15" 1280x1024 SVGA NEW ENERGY STAR!	\$339
MAG	15" 1280x1024 Digital menu	\$459
MAG	17" 1280x1024 SVGA NEW ENERGY STAR!	\$659
MAG	17" 1280x1024 N. 16:10	\$759
MAG	17" 1280x1024 SVGA NEW ENERGY STAR!	\$799
CTX	14" 28 SVGA 1024x768 N. 50-30Hz Vertical	\$249
CTX	15" 28 SVGA 1280x1024 NEW ENERGY STAR!	\$305
CTX	17" 28 SVGA 1280x1024 50-70Hz Vertical	\$389
14"	39 SVGA 1024x768 Interlaced 50-70Hz Vertical NoDPG	\$169
14"	28 SVGA 1024x768 Interlaced 50-70Hz Vertical -EMAG	\$210
14"	28 SVGA 1024x768 Non-Interlaced 50-70Hz Vertical	\$210



MAG
INNOVISION
15" DX15F
Energy Star
1280x1024
\$339



THE HOTTEST HARDWARE AT THE HOTTEST PRICES



AUSTIN DESKTOP SYSTEMS

Genesis Desktop Systems

486SX/33, 212MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,299
486DX/33, 212MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,439
486DX/50, 212MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,429
486DX/66, 212MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,489

486SX/33, 425MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,399
486DX/33, 425MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,539
486DX/50, 425MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,529
486DX/66, 425MB HD, 4MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,589

Premier Desktop Systems

486DX/33, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,619
486DX/50, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,609
486DX/66, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,669
486DX/33 Tower, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,679
486DX/50 Tower, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,669
486DX/66 Tower, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,719

486DX/33, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,719
486DX/50, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,709
486DX/66, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,769
486DX/33 Tower, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,809
486DX/50 Tower, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,799
486DX/66 Tower, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,819

486DX/33, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,919
486DX/50, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,909
486DX/66, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,969
486DX/33 Tower, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,969
486DX/50 Tower, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,959
486DX/66 Tower, PCI, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,019

Power Systems - Intel Pentium™ Based Systems

P5/60, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$1,999
P5/66, 425MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,279
P5/90, 425MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,499
P5/60 Tower, 425MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,049
P5/66 Tower, 425MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,329
P5/90 Tower, 425MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,549

P5/60, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,099
P5/66, 540MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,379
P5/90, 540MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,599
P5/60 Tower, 540MB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,149
P5/66 Tower, 540MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,429
P5/90 Tower, 540MB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,649

P5/60, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,309
P5/66, 1GB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,589
P5/90, 1GB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,819
P5/60 Tower, 1GB HD, 8MB RAM, 1MB Video RAM, 14" SVGA Monitor	\$2,359
P5/66 Tower, 1GB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,639
P5/90 Tower, 1GB HD, 8MB RAM, 2MB Video RAM, 15" NI SVGA Monitor	\$2,869

AUSTIN NOTEBOOKS

Austin 486 Dual Scan Color Notebooks

486SX/25, 127MB HD, 4MB RAM	\$1,899
486SX/33, 262MB HD, 4MB RAM	\$2,029
486DX/33, 340MB HD, 4MB RAM	\$2,259
486DX/50, 524MB HD, 4MB RAM	\$2,489
486DX/66, 340MB HD, 8MB RAM	\$2,578

Austin 486 Monochrome Notebooks

486SX/25, 262MB HD, 4MB RAM	\$1,489
486SX/33, 262MB HD, 4MB RAM	\$1,539
486DX/33, 262MB HD, 4MB RAM	\$1,689
486DX/50, 262MB HD, 4MB RAM	\$1,739
486DX/66, 340MB HD, 8MB RAM	\$2,118

Austin 486 TFT Active Matrix Color Notebooks

486SX/33, 340MB HD, 4MB RAM	\$3,149
486DX/33, 262MB HD, 4MB RAM	\$3,199
486DX/50, 340MB HD, 4MB RAM	\$3,339
486DX/66, 262MB HD, 8MB RAM	\$3,399

Austin 486 DX4 Business Audio Notebooks with Dual Scan Color Display

486DX4/75, 340MB HD, 8MB RAM	\$2,849
486DX4/100, 524MB HD, 8MB RAM	\$3,199
486DX4/100, 340MB HD, 16MB RAM	\$3,549

Austin 486 DX4 Business Audio Notebooks Active Matrix Color Display

486DX4/75, 340MB HD, 8MB RAM	\$3,749
486DX4/100, 340MB HD, 8MB RAM	\$3,849
486DX4/100, 340MB HD, 16MB RAM	\$4,499

MULTI MEDIA



Dolphin Double Speed CD-ROM Drive	\$159
ISP-16 Audio Card	\$89
ISP-16 Multimedia Kit	\$279
ISP-16 Deluxe Multimedia Kit	\$349
VSP-24 Video Capture Board	\$199
Telemetry-32 Telephony/Audio Board	\$349
DSP-16 Audio Card	\$99
DSP-16 SCSI Audio Board	\$119
PCMCIA Audio Card	\$349



IPC POINT OF SALE



IPC TECHNOLOGIES, INC.

MPS-328 MSRP \$2,399

386/SX-33 based POS System

Cash Drawer, Receipt Printer, Operator Display, 88-Key Keyboard, 5 Position Security Lock, 40MB Hard Disk, 2 Serial Ports, Bar Code Reader, Networkable or Stand Alone

POS II SBE (V) MSRP \$2,349

386/SX or 486 based POS System

136-Key Waterproof Keyboard, 1.44" Floppy Drive, 9" SVGA Operator Display Monitor, 5 Position Security Lock, 2 Serial Ports, 1 Parallel Port, DOS Based, Fully Networkable or Stand Alone



FDS 3600 MSRP \$3,599

386/SX based POS System

640x480 LCD Glass Touch Screen, Spill Proof Case, 240x48 Customer Display, 63 Position Key Security, Handles up to 2 Cash Drawers, 4 Serial, 2 Parallel Ports, Fully Networkable or Stand Alone

FDS 2900 MSRP \$ 2,299

386/SX based POS System

100-Key Micro-motion Touch Panel, Spill Proof Case, 240x48 Operator Display, 6 Line Customer Display, 63 Position Key Security, Handles up to 2 Cash Drawers, 4 Serial, 2 Parallel Ports, Fully Networkable or Stand Alone

GRS 3800D/1 MSRP \$1,699.

386/SX based Modular POS System

88-Key Wet Proof Keyboard, 5 Level, Key Lock, 4 Serial, 2 Parallel Ports, Supports 2 Cash Drawers, Scanner Port, Networkable or Stand Alone

Call for Dealer Pricing and Information.

NOTEBOOK ACCESSORIES

4 MB RAM, \$219; 16 MB RAM, CALL; Docking Station, \$299; Car Adapter, \$59; PCMCIA 1.44 Fax/Modem, \$299; Built-In 1.44 Fax/Modem, \$199; PCMCIA Ethernet Adapter, \$220 (Only with system purchase.)

Ask your Austin Direct Sales Representative about custom notebook and desktop system configurations.



Ad Code: PCM101194

Copyright © 1994 Austin Direct, all rights reserved. The Intel Inside logo is a registered trademark of Intel Corp. Intel Pentium, DX4 DX2 and SX are trademarks of Intel Corp. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. The Energy Star emblem does not represent EPA endorsement of any product or service. All other company names and products are trademarks of their respective owners. These prices are special promotional prices. Prices and specifications are subject to change without notice. Shipping, handling and applicable sales taxes are not included in the prices. There are no returns for credit after 30 days. Original shipping and handling fees, as well as return shipping charges are non-refundable. Call or write Austin Direct for more information on warranties and policies. Austin Direct is not responsible for errors in typography and photography. Leasing price reflects a 36-month term contract.

AUSTIN D-I-R-E-C-T

1-800-669-7181

2121 Energy Drive, Austin, Texas 78758
512-339-3500 • FAX 512-454-1357

Government Sales: 1-800-833-4472
Fortune 1000 Sales: 1-800-622-5506
For More Information By Fax: 1-800-341-7500

PERCOMP™

... Tell me **THAT** works...

FOR WHAT I'M WANTING TO DO!

Here's the scoop...

buying a computer anymore . . . you are investing in a company and its reputation for quality, service and support. The right choice should provide a total solution to your present and future computing needs.

Choosing a computer system today has become increasingly complicated. Competition is fierce and the number of options can be overwhelming. **THAT** is why it's important to remember you're not just

PERCOMP Microsystems is **THAT** complete solution!

We, at **PERCOMP Microsystems** consider our policy of 100% customer satisfaction and our three year **TRUE WARRANTY** a guiding principle.

Everything we do and every decision we make is based on **THAT** underlying foundation, by offering a risk-free alternative to the impersonal industry giants, at more competitive prices.

We engineer each of our high performance systems using only the highest quality, name-brand components available. And, because

PERCOMP Microsystems remains at the forefront of the Open System movement, you'll have compatibility with OS/2, DOS, WINDOWS, WINDOWS NT, UNIX, LANTASTIC and NOVELL.

At **PERCOMP Microsystems**, we don't just preach customer satisfaction — we demand it! We are committed to continuing our growth, one satisfied customer at a time.



THE TRUE THREE YEAR WARRANTY:

- Three Year "TRUE WARRANTY" On All Systems
- Full 3 Years On Parts And Labor Provided
- On-Site Nationwide
- 30-Day Satisfaction Guarantee ♦
- 24-Hours-a-day, 7 Days A Week, Technical Hotline ♦
- On-Line Bulletin Board Service ♦
- Lifetime, Toll-Free Technical Support ♦

The Intel Inside Logo, Intel and Pentium are registered trademarks of the Intel Corporation. All registered and unregistered trademarks are the sole property of their respective companies.



HOME STARTER SERIES

- 4MB RAM (expandable to 128MB)
- 256K Write-back cache RAM
- 420MB 14ms IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- Local-BUS graphics card (1MB)
- 14" SVGA Monitor, 1024i, .28mm,
- Energy Star Compliant
- Desktop or Mini Tower Case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS-Works Multimedia CD
- Transporter Menu System
- True 3 Year On-Site Warranty

INTEL486™ SX-33
VESA Local-BUS

#007433

INTEL486™ DX2-50
VESA Local-BUS

#007602

INTEL486™ DX2-66
VESA Local-BUS

#007666

FAMILY MEDIA SERIES

- 8MB RAM (expandable to 128 MB)
- 256K Write-back cache RAM
- 420MB 14ms IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- 16-bit sound card and speakers
- 9600/2400 Fax/Modem with software
- Local-BUS graphics card (1MB)
- 14" SVGA Monitor, 1024NI, .28mm,
- Energy Star Compliant
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS-Works Multimedia, Encarta '94,
- Money, Baseball, Arcade & Scenes
- Transporter Menu System
- True 3 Year On-Site Warranty

INTEL486™ SX-33
VESA Local-BUS

\$1,699

#007733

INTEL486™ DX2-66
VESA Local-BUS

\$1,849

#007766

Pentium™ Processor
PCI-60MHz

\$2,199

#007760

EXECUTIVE SERIES

- 8MB RAM (expandable to 128 MB)
- 256K Write-back cache RAM
- 420MB 14ms IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- 16-bit sound card and speakers
- Local-BUS graphics card (1MB)
- 15" SVGA Monitor, 1024NI, .28mm,
- Energy Star Compliant
- Desktop or Tower Case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of Lotus 123, AMI PRO,
- Freelance or Approach for Windows
- Transporter Menu System
- True 3 Year On-Site Warranty

INTEL486™ DX2-66
VESA Local-BUS

\$1,899

#007802

Pentium™ Processor
PCI-60MHz

\$2,399

#007860

Pentium™ Processor
PCI-90MHz

\$2,649

#007890

PROFESSIONAL SERIES

- 16MB RAM (expandable to 192MB)
- 256K Write-back cache RAM
- 540MB 12ms IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- 16-bit sound card and speakers
- PCI Local-BUS graphics card (2MB)
- 17" SVGA Monitor, 1024NI, .28mm,
- Energy Star & Low Radiation
- Desktop or Tower Case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Choice of 2-Lotus™ 123, AMI PRO,
- Freelance or Approach for Windows
- Transporter Menu System
- True 3 Year On-Site Warranty

Pentium™ Processor
PCI-60MHz

\$3,249

#007960

Pentium™ Processor
PCI-66MHz

\$3,349

#007966

Pentium™ Processor
PCI-90MHz

\$3,549

#007990

DEALER INFORMATION

PC Innovation Computers
Raleigh & Cary, NC
Raleigh: 800-948-6716
Cary: 919-677-8881

Kron Computers
Oklahoma City, OK
405-682-3536
405-741-0486

Metro Office Systems
Kansas City & St. Louis
Kansas City: 913-321-9528
St. Louis: 314-995-9709

Supercom Industries, Inc.
Chicago, IL
800-935-0261
708-228-9111

Maxum Systems
New York, Fairfield
800-937-5512
718-643-3385

Computer Pro
Newark, CA & Seattle, WA
Newark: 510-490-8118
Seattle: 206-746-0788

SIMPLY BETTER COMPUTERS, INC.

Dallas, TX
214-484-7744

Plano, TX
214-578-9185

Arlington, TX
817-784-0702

Richardson, TX
214-234-2198

No service charge for credit card orders. We are not responsible for errors in typography or photography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. Please call PerComp for an RMA number prior to returning any merchandise. Call or write for more information on warranties and deliveries. Call for latest pricing information.

PERCOMP Microsystems, Inc.

The Home Solution -

1-800-856-6688

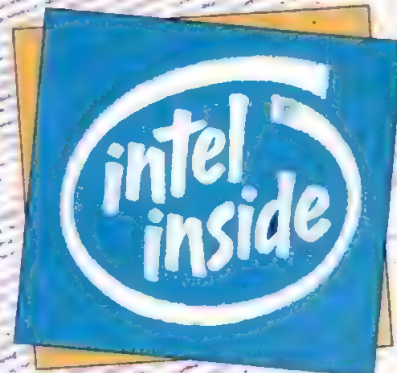
Fax: 214-234-8658, BBS: 214-234-8376

Monday - Friday 8:00 a.m. - 7:00 p.m.

Saturday - 10:00 a.m. - 4:00 p.m. (CDT)



MASTERCARD,
VISA, DISCOVER &
AMERICAN EXPRESS
ACCEPTED



COMPATIBILITY PERFORMANCE TESTED

Each component in a VTech Multimedia system is extensively checked for compatibility and performance. We also carry a variety of multimedia software in specially priced bundles.

4 HOUR BURN-IN ON EVERY SYSTEM

Each system is built to your exact specifications, and must pass through five quality control stations, including a 4 hour burn-in. Only after perfect scores at every stage of testing will your system be ready to ship.



486DX2/66V

- Intel® Verified: for the Pentium® OverDrive Processor
- 8MB RAM with 128K
- 528MB (12ms) Conner IDE Hard Drive
- Kelvin 64 Graphics Card on a VL Bus with 2MB
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Koss Stereo Speakers
- 3.5" Diskette Drive
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

INDIVIDUALLY TESTED HARD DRIVES

Each hard drive receives individual testing as well as testing in a system to insure optimum performance. Drives are pre-loaded with system software to provide an easy start-up for beginners or experts.

INTEGRATED MANUFACTURING

We design our own motherboards right down to the custom chip sets, giving us complete control of the performance and durability of the product.

**VTECH'S MULTIMEDIA 486DX2/66 OFFERS A NUMBER OF
FEATURES MISSING FROM ITS COMPETITION...**

\$1499

...THIS NUMBER IS ESPECIALLY NOTEABLE.

"Serious systems and bare-knuckles pricing make VTech the best."

- PC COMPUTING, JULY 1994

PC Computing
★★★★

**"The overall performance of the VTech computer give it the highest
rating of any of the 486 systems, and the price is outstanding!"**

- COMPUTER SHOPPER

**COMPUTER
SHOPPER**

For the past ten years, VTech has built its reputation on more than just offering the latest technology at the lowest prices. We also offer features that improve the quality of each of our computers, making them easier to operate, better built and longer lasting. Like most of the latest multimedia systems, VTech's Multimedia 486DX2/66V comes with 8MB of memory, a double-speed CD-ROM, a 16-bit stereo sound board, high-speed VLB graphics with 1MB, and pre-loaded MS-DOS/Windows.

ERGONOMIC KEYBOARD

This premium quality keyboard has individual switches for improved performance and better feel.

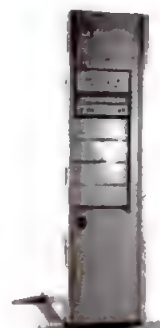
But unlike most systems, it has an ergonomic keyboard for improved performance and better feel, a baked enamel high-quality metal case that resists scratching and virtually resists aging, a four hour burn-in to ensure quality

VTECH[®]
expotech[™]

performance, and an
incredible price tag.
\$1499.



Perfect for alongside a Desktop - the VTech Personal Tower has plenty of room for drive storage - 5 external drive bays.



The VTech Hi-Tower provides excellent storage and expandability with 6 external drive bays.

800-816-0070

\$1999

VTech's philosophy of giving more, for no more, extends through our entire line of computers. Consider the value of the VTech LT450C lightweight notebook. You get 4MB RAM expandable to 20MB, 340MB hard drive, accelerated video, small footprint and pre-loaded MS-DOS/Windows. Plus a 30-day guarantee, an option to purchase System Guard™ four year on-site service program, and a lifetime of toll-free technical support.

What's more, our "As You Like It" customization program provides consultants to help you choose the best base system, then sort out your options to ensure you build a system that's right for you. You see, at VTech, we don't just make our computers easy to afford, we also make them easy to use.

Notebooks

VIVID DUAL SCAN COLOR SCREEN

VTech has sourced the highest quality Dual Scan Color LCD on the market. Made by Sharp, this screen beats others in clarity, brightness, contrast and speed.

REMOVABLE BATTERY PACK

The standard NiMH battery pack provides long life and is easily swapped with a second battery for extended use.

100% COMPATIBLE PCMCIA SLOTS

The VTech PCMCIA slot supports two Type II or one Type III card. Extensive compatibility ensures that high-speed modems, networking cards and even wave table sound boards are 100% compatible.

CENTER-MOUNTED TRACKBALL

With our LT450C, you get an integrated center mounted trackball with palm rest.

REMOVABLE HDD

The LT450's hard drive is removable for added security and flexibility.



LT432C

- Intel® 486SX/33
- 4MB RAM Expandable to 20MB
- 200MB Hard Drive
- 5.5 lbs.
- NiMH Battery
- 9.7" Sharp Dual Scan Color Screen
- Accelerated Video
- Integrated Trackball
- Small Footprint (11" x 8.4" x 1.8")
- 2 PCMCIA Type II or 1 Type III slots
- Pre-Loaded MS-DOS / Windows

\$1699

LT453C

- Intel 486DX/50
- 4MB RAM Expandable to 20MB
- 200MB Hard Drive
- 5.5 lbs.
- NiMH Battery
- 9.7" Sharp Dual Scan Color Screen
- Accelerated Video
- Integrated Trackball
- Small Footprint (11" x 8.4" x 1.8")
- 2 PCMCIA Type II or 1 Type III slots
- Pre-Loaded MS-DOS/ Windows

\$1799

LT450C

- Intel 486DX/50
- 4MB RAM Expandable to 20MB
- 340MB Hard Drive
- 6 lbs.
- NiMH Battery
- 9.7" Sharp Dual Scan Color Screen
- Accelerated Video
- Center-mounted Trackball with palm rest (19mm)
- Small (11" x 8.4" x 2") Footprint
- 2 PCMCIA Type II or 1 Type III slots
- Pre-Loaded MS-DOS/Windows

\$1999

LT470C

- Intel 486DX/75
- 8MB RAM Expandable to 20MB
- 524 MB Hard Drive
- 6 lbs.
- NiMH Battery
- 9.7" Sharp Dual Scan Color Screen
- Accelerated Video
- Center-mounted Trackball with palm rest (19mm)
- Small (11" x 8.4" x 2") Footprint
- 2 PCMCIA Type II or 1 Type III slots
- Pre-Loaded MS-DOS/Windows

\$2699

Desktop Systems

486SX/33

- Pentium® Technology Ready
- 4MB RAM
- 213MB (12ms) Conner IDE Hard Drive
- Local Bus Graphics with 1 MB
- 3.5" Diskette Drive
- 14" VTech SVGA Monitor
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$799

w/486SX/25

\$699

486SX/33V

- Intel® Verified: for the Pentium OverDrive® Processor
- 4MB RAM
- 424MB (14ms) Conner IDE Hard Drive
- Double-Speed CD-ROM
- 16-Bit Stereo Sound Board
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$1099

486DX2/50V

- Intel Verified: for the Pentium OverDrive Processor
- 8MB RAM with 128K Cache
- 424MB (14ms) Conner IDE Hard Drive
- Double-Speed CD ROM
- 16-Bit Stereo Sound Board
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS /Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$1299

486DX2/66V

- Intel Verified: for the Pentium OverDrive Processor
- 8MB RAM with 128K Cache
- 528MB (12ms) Conner IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Koss Stereo Speakers
- Kelvin 64 Graphics Card on VL Bus with 2 MB
- 3.5" Diskette Drive
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$1499

w/5-Bay Case and Colorado Tape Backup

\$1699

PCI Systems

P5-60

- Intel 60MHz Pentium CPU
- 8MB RAM with 256K Cache
- 424MB (14ms) Conner IDE Hard Drive
- PCI Local Bus Graphics with 1MB
- Built-in SCSI Adapter
- 3.5" Diskette Drive
- Enhanced Parallel Port
- High Speed Serial Port Controllers
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$1699

486DX2/66P

- Intel Verified: for Pentium OverDrive Processor
- 16MB RAM with 256K Cache
- 528MB (12ms) Conner IDE Hard Drive
- PCI Local Bus Graphics with 1MB
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Digital Quality Speakers
- 3.5" Diskette Drive
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$2199

P5-66

- Intel 66MHz Pentium CPU
- 16MB RAM with 256K Cache
- 850MB (11ms) Conner IDE Hard Drive
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 16-Bit Stereo Sound Board
- Digital Quality Speakers
- Built-in SCSI Adapter
- 3.5" Diskette Drive
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS /Windows
- Enhanced 101-Key Keyboard & Mouse
- All Metal Desktop Case

\$2599

P5-90

- Intel 90MHz Pentium CPU
- 16MB RAM with 256K Cache
- 1.27GB (11ms) Conner IDE Hard Drive
- Double-Speed CD-ROM
- 16-Bit Stereo Sound Board
- Koss Stereo Speakers
- Kelvin 64 Graphics Card on PCI Local Bus with 2MB
- 3.5" Diskette Drive
- 15" VTech SVGA Monitor
- Dual Cooling Fans
- Pre-Loaded MS-DOS/ Windows
- Enhanced 101-Key Keyboard & Mouse
- VTech CD-ROM software bundle
- All Metal Desktop Case

\$3399

System Guard 4-year service & protection program.

System Guard™ is a joint service and protection program from VTech Industries and General Electric designed to give you four years of complete service on your VTech purchase. This plan includes four years of on site service, coverage on all VTech purchases bought at the same time as your computer, and toll free service calls from anywhere in the United States.



VTech®
expotech™

800-816-0070



CIRCLE 305 ON READER SERVICE CARD

The Intel Inside logo, Intel, Pentium and OverDrive are registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping.

WE WILL TRY TO MATCH OR BEAT ANY ADVERTISED PRICE. CALL FOR LATEST PRICING!!

WE ACCEPT PO'S
FROM QUALIFIED FIRMS

M E M O R Y

NO SURCHARGE
FOR MC, VISA AE & DISCOVER

CACHE MEMORY

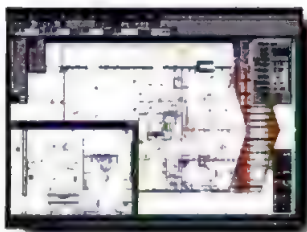
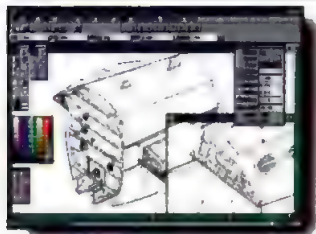
ITEMS	ITEMS	ITEMS	ITEMS
9K68	19.00	2886	8.50
32K68 (3.3V)	19.00	80287-1	7.00
64K68	11.00	80287-2	14.00
64K68	11.00	80287-3	14.00
128K68	11.00	80287-4	14.00
		80287-5	14.00
		80287-6	14.00
		80287-7	14.00
		80287-8	14.00
		80287-9	14.00
		80287-10	14.00
		80287-11	14.00
		80287-12	14.00
		80287-13	14.00
		80287-14	14.00
		80287-15	14.00
		80287-16	14.00
		80287-17	14.00
		80287-18	14.00
		80287-19	14.00
		80287-20	14.00
		80287-21	14.00
		80287-22	14.00
		80287-23	14.00
		80287-24	14.00
		80287-25	14.00
		80287-26	14.00
		80287-27	14.00
		80287-28	14.00
		80287-29	14.00
		80287-30	14.00
		80287-31	14.00
		80287-32	14.00
		80287-33	14.00
		80287-34	14.00
		80287-35	14.00
		80287-36	14.00
		80287-37	14.00
		80287-38	14.00
		80287-39	14.00
		80287-40	14.00
		80287-41	14.00
		80287-42	14.00
		80287-43	14.00
		80287-44	14.00
		80287-45	14.00
		80287-46	14.00
		80287-47	14.00
		80287-48	14.00
		80287-49	14.00
		80287-50	14.00
		80287-51	14.00
		80287-52	14.00
		80287-53	14.00
		80287-54	14.00
		80287-55	14.00
		80287-56	14.00
		80287-57	14.00
		80287-58	14.00
		80287-59	14.00
		80287-60	14.00
		80287-61	14.00
		80287-62	14.00
		80287-63	14.00
		80287-64	14.00
		80287-65	14.00
		80287-66	14.00
		80287-67	14.00
		80287-68	14.00
		80287-69	14.00
		80287-70	14.00
		80287-71	14.00
		80287-72	14.00
		80287-73	14.00
		80287-74	14.00
		80287-75	14.00
		80287-76	14.00
		80287-77	14.00
		80287-78	14.00
		80287-79	14.00
		80287-80	14.00
		80287-81	14.00
		80287-82	14.00
		80287-83	14.00
		80287-84	14.00
		80287-85	14.00
		80287-86	14.00
		80287-87	14.00
		80287-88	14.00
		80287-89	14.00
		80287-90	14.00
		80287-91	14.00
		80287-92	14.00
		80287-93	14.00
		80287-94	14.00
		80287-95	14.00
		80287-96	14.00
		80287-97	14.00
		80287-98	14.00
		80287-99	14.00
		80287-100	14.00

Individual D-RAM Chips

MEMORY FOR DATA AND APPLE				0067	30.00
ITEMS	QTY	UNIT	PRICE	AMOUNT	
1Mbit	1	0.00	0.45	0.45	
2Mbit	1	0.00	0.45	0.45	
4Mbit	1	0.00	0.45	0.45	
8Mbit	1	0.00	0.45	0.45	
16Mbit	1	0.00	0.45	0.45	
32Mbit	1	0.00	0.45	0.45	
64Mbit	1	0.00	0.45	0.45	
128Mbit	1	0.00	0.45	0.45	
256Mbit	1	0.00	0.45	0.45	
512Mbit	1	0.00	0.45	0.45	
1024Mbit	1	0.00	0.45	0.45	
2048Mbit	1	0.00	0.45	0.45	
4096Mbit	1	0.00	0.45	0.45	
8192Mbit	1	0.00	0.45	0.45	
16384Mbit	1	0.00	0.45	0.45	
32768Mbit	1	0.00	0.45	0.45	
65536Mbit	1	0.00	0.45	0.45	
131072Mbit	1	0.00	0.45	0.45	
262144Mbit	1	0.00	0.45	0.45	
524288Mbit	1	0.00	0.45	0.45	
1048576Mbit	1	0.00	0.45	0.45	
2097152Mbit	1	0.00	0.45	0.45	
4194304Mbit	1	0.00	0.45	0.45	
8388608Mbit	1	0.00	0.45	0.45	
16777216Mbit	1	0.00	0.45	0.45	
33554432Mbit	1	0.00	0.45	0.45	
67108864Mbit	1	0.00	0.45	0.45	
134217728Mbit	1	0.00	0.45	0.45	
268435456Mbit	1	0.00	0.45	0.45	
536870912Mbit	1	0.00	0.45	0.45	
1073741824Mbit	1	0.00	0.45	0.45	
2147483648Mbit	1	0.00	0.45	0.45	
4294967296Mbit	1	0.00	0.45	0.45	
8589934592Mbit	1	0.00	0.45	0.45	
17179869184Mbit	1	0.00	0.45	0.45	
34359738368Mbit	1	0.00	0.45	0.45	
68719476736Mbit	1	0.00	0.45	0.45	
137438953472Mbit	1	0.00	0.45	0.45	
274877906944Mbit	1	0.00	0.45	0.45	
549755813888Mbit	1	0.00	0.45	0.45	
1099511627776Mbit	1	0.00	0.45	0.45	
2199023255552Mbit	1	0.00	0.45	0.45	
4398046511104Mbit	1	0.00	0.45	0.45	
8796093022208Mbit	1	0.00	0.45	0.45	
17592186044416Mbit	1	0.00	0.45	0.45	
35184372088832Mbit	1	0.00	0.45	0.45	
70368744177664Mbit	1	0.00	0.45	0.45	
140737488355328Mbit	1	0.00	0.45	0.45	
281474976710656Mbit	1	0.00	0.45	0.45	
562949953421312Mbit	1	0.00	0.45	0.45	
1125899806842624Mbit	1	0.00	0.45	0.45	
2251799613685248Mbit	1	0.00	0.45	0.45	
4503599227370496Mbit	1	0.00	0.45	0.45	
9007198454740992Mbit	1	0.00	0.45	0.45	
18014396909481984Mbit	1	0.00	0.45	0.45	
36028793818963968Mbit	1	0.00	0.45	0.45	
72057587637927936Mbit	1	0.00	0.45	0.45	
144115175275855872Mbit	1	0.00	0.45	0.45	
288230350551711744Mbit	1	0.00	0.45	0.45	
576460701103423488Mbit	1	0.00	0.45	0.45	
1152921402206846976Mbit	1	0.00	0.45	0.45	
2305842804413693952Mbit	1	0.00	0.45	0.45	
4611685608827387904Mbit	1	0.00	0.45	0.45	
9223371217654775808Mbit	1	0.00	0.45	0.45	
18446742435309551616Mbit	1	0.00	0.45	0.45	
36893484870619103232Mbit	1	0.00	0.45	0.45	
73786969741238206464Mbit	1	0.00	0.45	0.45	
147573939482476412928Mbit	1	0.00	0.45	0.45	
295147878964952825856Mbit	1	0.00	0.45	0.45	
590295757929905651712Mbit	1	0.00	0.45	0.45	
1180591515859811303424Mbit	1	0.00	0.45	0.45	
2361183031719622606848Mbit	1	0.00	0.45	0.45	
4722366063439245213696Mbit	1	0.00	0.45	0.45	
9444732126878490427392Mbit	1	0.00	0.45	0.45	
18889464253756980854784Mbit	1	0.00	0.45	0.45	
37778928507513961709568Mbit	1	0.00	0.45	0.45	
75557857015027923419136Mbit	1	0.00	0.45	0.45	
151115714030055846838272Mbit	1	0.00	0.45	0.45	
30223142806011169367636268672Mbit	1	0.00	0.45	0.45	
60446285612022338735272537344Mbit	1	0.00	0.45	0.45	
12089257124044667667636268672Mbit	1	0.00	0.45	0.45	
24178514248089335335272537344Mbit	1	0.00	0.45	0.45	
48357028496178670668645074688Mbit	1	0.00	0.45	0.45	
96714056992357341337272537344Mbit	1	0.00	0.45	0.45	
1934281139846728022541454440416Mbit	1	0.00	0.45	0.45	
3868562279693456045082908880832Mbit	1	0.00	0.45	0.45	
7737124559386910206444443466666656Mbit	1	0.00	0.45	0.45	
1547424911877382412888889173333568Mbit	1	0.00	0.45	0.45	
30948498237550445124444445866667136Mbit	1	0.00	0.45	0.45	
6189699647509028051911115866622656Mbit	1	0.00	0.45	0.45	
12379399295018056103822222173335312Mbit	1	0.00	0.45	0.45	
2475879859003601020644443466666656Mbit	1	0.00	0.45	0.45	
4951759718007202041288888917333568Mbit	1	0.00	0.45	0.45	
99035194360144045124444445866667136Mbit	1	0.00	0.45	0.45	
1980703887202809028022222173335312Mbit	1	0.00	0.45	0.45	
3961407774405618051911115866622656Mbit	1	0.00	0.45	0.45	
7922815548811236045082908880832Mbit	1	0.00	0.45	0.45	
1584563107652272020644443466666656Mbit	1	0.00	0.45	0.45	
316912621530454404512444445866667136Mbit	1	0.00	0.45	0.45	
6338252430609088051911115866622656Mbit	1	0.00	0.45	0.45	
12676504861218176045082908880832Mbit	1	0.00	0.45	0.45	
2535300972236435202064443466666656Mbit	1	0.00	0.45	0.45	
5070601944472870404512444445866667136Mbit	1	0.00	0.45	0.45	
101412038889457408051911115866622656Mbit	1	0.00	0.45	0.45	
202824077778914816045082908880832Mbit	1	0.00	0.45	0.45	
4056481555578296320206444346666656Mbit	1	0.00	0.45	0.45	
81129631111565926404512444445866667136Mbit	1	0.00	0.45	0.45	
162258263637311840051911115866622656Mbit	1	0.00	0.45	0.45	
3245165272746236800206444346666656Mbit	1	0.00	0.45	0.45	
649033054559247360045082908880832Mbit	1	0.00	0.45	0.45	
129806610910494720051911115866622656Mbit	1	0.00	0.45	0.45	
259613221800989440051911115866622656Mbit	1	0.00	0.45	0.45	
5192264436019788800206444346666656Mbit	1	0.00	0.45	0.45	
1038452887203957760045082908880832Mbit	1	0.00	0.45	0.45	
2076905774407915520051911115866622656Mbit	1	0.00	0.45	0.45	
4153811548815831040051911115866622656Mbit	1	0.00	0.45	0.45	
8307623097631662080051911115866622656Mbit	1	0.00	0.45	0.45	
16615246192633324160051911115866622656Mbit	1	0.00	0.45	0.45	
33230492384126648320051911115866622656Mbit	1	0.00	0.45	0.45	
66460984768253296640051911115866622656Mbit	1	0.00	0.45	0.45	
1329219753765065920051911115866622656Mbit	1	0.00	0.45	0.45	
2658439507530131840051911115866622656Mbit	1	0.00	0.45	0.45	
5316879015060263680051911115866622656Mbit	1	0.00	0.45	0.45	
10633758030120527360051911115866622656Mbit	1	0.00	0.45	0.45	
21267516060241054720051911115866622656Mbit	1	0.00	0.45	0.45	
42535032120482109440051911115866622656Mbit	1	0.00	0.45	0.45	
85070064240964218880051911115866622656Mbit	1	0.00	0.45	0.45	
170140128481928437760051911115866622656Mbit	1	0.00	0.45	0.45	
340280256963856875520051911115866622656Mbit	1	0.00	0.45	0.45	
68056051392771375040051911115866622656Mbit	1	0.00	0.45	0.45	
136112102785542750080051911115866622656Mbit	1	0.00	0.45	0.45	
272224205571085501600051911115866622656Mbit	1	0.00	0.45	0.45	
544448411142171003200051911115866622656Mbit	1	0.00	0.45	0.45	
1088896823164342006400051911115866622656Mbit	1	0.00	0.45	0.45	
2177793646328684012800051911115866622656Mbit	1	0.00	0.45	0.45	
4355587292657368025600051911115866622656Mbit	1	0.00	0.45	0.45	
8711174585314736051200051911115866622656Mbit	1	0.00	0.45	0.45	

More Options than Computer Dating in San Francisco.
 More Features than a 200 Screen Cineplex.
 More Tools than a Builder's Convention.

DESIGNCAD 2D FOR WINDOWS!



IF YOU WOULD LIKE TO RECEIVE
 MORE INFORMATION, CALL, WRITE
 OR FAX FOR A 16-PAGE COLOR
 BROCHURE AND DEMO DISK.

Why DesignCAD? DesignCAD comes complete! This is not a watered-down CAD system with Limited Technology. Neither is it a CAD system that you will out-grow tomorrow. DesignCAD is a powerful, yet easy to use, CAD package that anyone can afford! With over 500,000 users worldwide including AT&T and the U.S. Navy, DesignCAD is truly the professionals' choice. Just look at some of DesignCAD's super features!

- **Drafting Tools-** DesignCAD 2D for Windows boasts an extensive selection of drafting tools with easy to understand icons.

Just point and click!

- **Quick-Change Edit Box-** Simply enter the new information and let DesignCAD make all of your changes for you!

- **Full Clipboard Support-** Easily cut and paste graphic elements into other Windows applications.

- **Built-In Programming Language**

Even novice users can customize DesignCAD by creating specific commands that fit their particular needs. A real time saver!

- **Print at any Scale-** DesignCAD can output large drawings even on narrow carriage printers and small plotters.

- **500 FREE Symbols-** Pre-drawn so you don't have to!



NOW AVAILABLE ON CD-ROM!
 ALSO AVAILABLE - DESIGNCAD 2D/DESIGSYM BUNDLE OF 6700 SYMBOLS!

To Order DesignCAD

Call (918)825-7555 Fax (918)825-6359

American Small Business Computers • One American Way • Pryor • OK • 74361

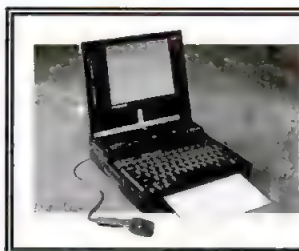


CIRCLE 025 ON READER SERVICE CARD

BULLDOG COMPUTER PRODUCTS RECEIVED PC COMPUTING'S

★★★★★ MAIL ORDER AWARD!!!

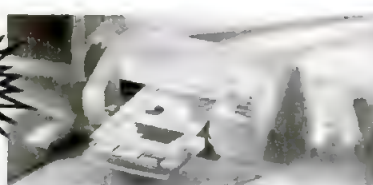
Call 1-800-438-6039



Canon

NOTEJET 486 - SLC/33

- 486 SLC/33 Mhz
- Built-In "Bubble Jet" Printer
- 340 MG - \$1959 • 200 MG - \$1759
- Dual Scan Color!
- 120 MG - \$2099 • 200 MG \$2349



Epson Stylus Color - \$549



BULLDOG
COMPUTER PRODUCTS

Network

3 Com	
3C503-16/5-pack	155/719
3C507 Etherlink 16	279
3C579 Ethernet EISA	229
3C509-Etherlink 3	109
3C509-5 Pack	469
3C509-20 Pack	1599
ARTISOFT	
Starter Kit 3Mbps/AE2	325/429
Lan Cards 2Mbps/AE2	129/179
Noderunner Si2000	85
Starter Kit 6.0	299
Lanlastic 5/10 User	329/569
2000/C add on Kit	159

INTEL	
Ether Express 16/16TP	89
Ether 16-5 Pack	429
Ether 16-20 Pack	1579
Ether Flash	89
Ether Flash 5 Pack	479
Ether Flash 20 Pack	1799
Ether Combo/5 Pack	115/509
Token Express 16/S	329
Netport EL/XL	359/399

NOVELL	
NE2000/5 Pack	69/329
NE3200	419
Novell Lite 1.1/starter kit	69/409
Netware 2.2 5/10 User	569/1289
Netware 3.12 5/10 User	579/1295
Netware 3.12-25 User	1869
Netware 3.12-50 User	2349
Netware 3.12-100 User	3399
Netware 4.0-5/10 User	719/1599
Netware 4.0-25 User	2299
Netware 4.0-50 User	3199

SMC	
PC130/PC130E	75/99
PC600WS/PC600FS	129/199
Ethercard 8 bit/16 bit	89/99
10 Base-T Card 8 bit/16 bit	99/99
3608TP 10BT concentrator	279
3512TP Ether. 10BT conc. 12 port	509

XIRCOM	
Pocket Ethernet PE3-10B	249
Pocket Ethernet PE3-10BT	249
Parallel Port Multiplexor	79
Aldus Pagemaker 5.0	499

Software

Carbon Copy/Close UP	129/119
Clarion ProDeveloper	299
Corel Draw 4.0 3-1/2"/CD	359/279
Dbase IV V.2.0	379
FoxPro 2.6 Pro Windows	415
FrameMaker	499
Freelance Plus 4.0	299
Harvard Graphics 2.0/3.0	149/359
Lotus 2.4/3.4	275/325
Lotus for Windows 4.0	279
Smart Suite Bundle	379
MS Dos 6.2	79
Microsoft Windows 3.1	79
Microsoft Windows NT	309
Microsoft Windows for Workgroup	139
Microsoft Access 1.0 for Windows	299
Microsoft Excel 4.0 for Windows	299
Microsoft Office	439
Microsoft Office Pro	509
Microsoft Word for Windows 6.0	289
Norton Utilities 8.0	105
Peachtree III Complete DOS	179
Paradox v4.0	519
Q&A 4.0	169
Winfax Pro	79
Word Perfect 6.0A	249
Word Perfect for Windows	268
Word Perfect 6.0 Upgrade	99

Chips

1 mg/4mg Smmms	45/149
HP 4mg/8 mg	159/319
Cyrix DRX2-20/40	219
Cyrix DRX2-25/50	259
Cyrix 33/66	299
Intel 387 SX or DX	85
Intel OverDrives	
SX-50-Double 20-25 Mhz	179
DX2-50-Double 20-25 Mhz	219
DX2-50-Double 33 Mhz	259

Monitors

NEC MULTISYNC	
3FGE/3V	549/459
4FGE	589
5FGE	969
5FGP	1079
6FGP	1949
CTX	
LX 1562 15" SVGA	319
6468/1451	229/249
1765 GM 17" SVGA	665

MAG	
LX 1450 14"	249
DX/MX15F 15"	349/439
DX/MX17F 17"	659/759
MX21F	1759

NANAO	
F760iW	1965
F550i/F550iW	899/979
F560iW/T560i	1229/1459
F340iW T660i	649/2049

VIEW SONIC	
1517G	419/779
17	879
20/21	1499/1679

Modems & Fax

BOCA	
14.4 Fax Modem Int/Ext	85/109
28.8 Int/Ext	179/219
Pocket 14.4	159
CARDINAL - 14.4 Int/Ext	89/139

GVC	
14.4 Int/Ext w/Fax	79/89
28.8 Int/Ext w/Fax	175/185

HAYES	
Optima 96	319
Optima 14.4 Ext/Int	349
PCMCIA 14.4	199
Pocket 14.4	289
Optima 28.8 Int/Ext	349/399
Accura 14.4 Fax Int/Ext	119/139
Accura 28.8 Ext	255

INTEL	
14.4/14.4 Fax Int/Ext	89/109
PC MCIA 14/96	129
PC MCIA 14.4/14.4 Fax	189
Satisfaction 400/400E	259/289

PRACTICAL PERIPHERALS	
ProClass 14.4 Int/Ext	149/169
PP 14400 Fax Int/Ext	105/119
28.8 Int/Ext	219/229
Pocket 14.4/28.8	259/369
PCMCIA	265

US ROBOTICS	
Sportster 14.4 Int	109
Sportster 14.4 Fax/Int	115
Sportster 14.4 Fax/Ext	135
Terbo HST Dual Std.	499
V.32 Terbo Fax Int	335
Worldport PCMCIA 14.4	199
Worldport Pocket 14.4	219

Printers

CANON	
BJ10sx	229
BJ200E	249
BJ230	389
BJC600	485
LBP-430	479
LBP-860-600 dpi	1069
BJ 800	1419

EPSON	
LX300	169
AP3250	169
AP3260	175
FX870	259
FX1170	345
LQ570	235

LQ870	425
LQ 1070+	355
LQ1170	589
LQ2550	879
DFX5000	1299
DFX8000	2189
Action Laser 1500	589
Action 1500-2 MG	639
Action 1100/1600	479/929
Stylus 400 Inkjet	199
Stylus 800	239
Stylus 1000	429
Stylus Color	549

HEWLETT-PACKARD	
Laserjet IV/IV+	1279/1419
Laserjet IVM+ w/toner	1949
Laserjet IVL	675
Laserjet IVP	959
Laserjet IVM	1369
Laserjet IVML	1039
HP IVsi	2989
Deskjet 550c	429
Deskjet 520/560c	289/569
HP Deskjet 1200c	1399
HP Deskjet 1200c/ps	2199
Upgrade for HP 1mb	79
Upgrade HP 2mb/4mb	99/159
Jet Direct 2550A	359

OKIDATA	
ML184 380	219/205
ML320/321	295 415
ML520 521	365 489
ML590/591	409 559
395/395c	949/1029
Laser 400E/810	495/899
Laser 410E-600 DPI	645
830/850	1189
PM3410	1199

TEXAS INSTRUMENTS	
Microwriter PS23	675
Microwriter Pro PS23	1329
PANASONIC	
2023/2130	179/199
1624/2124	379/295
2624 24 pin wide	369
4410 laser/4430	449 639
4440/5400	989 779

Scanners & Misc.

Canon 1 x 4015 Scanner	899
Epson Scanning 600	749
Epson 800	895
Logitech 256 w/OmniPage	129
HP Scanjet IIP w/interface	489
HP Scanjet IIC w/interface	949
Summasketch 12 x 12	255
AMERICAN POWER	
Back-ups 250/400/450	99/159/189
Back-ups 600/900	259/369

3241 E Washington Rd.
Martinez, GA 30907



BULLDOG
COMPUTER PRODUCTS

Notebooks

CANON	
486 SLC/25, 120 mg	1199
486 SLC/25, 120 mg-color	1749
Notejet 486 w/prnter-340 mg	1959
Notejet 486 w/prnter-200 mg	1759
Notejet II 50 Mhz-340 mg	2849
Notejet II 50 Mhz-260 mg	2549
EPSON	
486 SLC50/260 mg	1395
SHARP	
PC8650/PC8650II	2549/2749
TEXAS INSTRUMENTS	
4000 DX2/50 W/200	2279
4000 DX2 50E Active Color	2829
486/DX4/75	3549

Drives

CONNER	
212 mg/540 mg	169/319
IONEGA	
Transportable 150	559
Insider 150	459
Tape 250 mg insider	179
Tape 250 mg ext	319
21MG Floptical Insider	349
MAXTOR	
7213A 210 IDE	189
7245A 245 IDE	219
7345A 345 IDE	249
SEAGATE	
ST3243A 213 mg	179
ST3391A 260 mg	219
ST1480A 420 IDE	259
ST3491A 452 mg	249
ST3655A 528 mg	329
FLOPPY DRIVES	
1.2 MB/1 44 MB	49/39
Micro Solutions 1.2 MB/1 44 MB	169
Dual Floppy Drive	99

Tape Drives

CONNOR - 250	149
COLORADO MEMORY SYSTEMS	
DJ10 120 Meg Int Jumbo	119
DJ20 250 Meg Int Jumbo	149
Trakker 250	275
2120 Formatted Tape	17
MICRO SOLUTIONS	
80/250 Backpack	279
CD-2x	309
Back Pack 210 MG Drive	339

CD Rom

NEC 3X/6/3X	429/999
NEC 3XP-4X Pro	379/699
Textel Quad	489
Textel Quad	589
Chiron 535 Int	249
Chiron 535 Ext	349

NO CHARGE FOR CREDIT CARDS!

Open Weekdays 8:30 a.m. to 8:30 p.m.
Saturday 9:00 a.m. to 5:00 p.m.
(706) 860-7364 • Fax (706) 860-7358
Shipping (708) 228-6368



Get answers every day a spreadsheet can't give you *any day* Real Stats. Real Easy.

**New faster version
& Developer's Kit!
Call today!**

Use SPSS 6.1 for Windows when you need in-depth answers quickly and easily. Go beyond summary statistics and spreadsheet row-and-column math by using the right tool for the job. SPSS is a complete tool kit of statistics, graphs and reports that enables you to answer tough questions like:

- Why did sales drop in the last quarter?
- How satisfied are my customers?
- What are the patterns in my data?

SPSS products are used today for:

Survey research of all types

- Explore consumer awareness
- Compare perceptions of products
- Discover preferences by group

Marketing and sales analysis

- Analyze your customer database
- Forecast sales by product and region
- Improve mailing responses
- Learn which promotions work best

Quality improvement

- Assess process capability
- Reduce nonconformance
- Spot unnatural patterns of variation
- Track incidence of infection

Research of all types

- Test hypotheses
- Determine group differences
- Track performance over time
- Prepare professional reports

Answer your tough questions

You don't need a Ph.D. to learn or use SPSS 6.1 for Windows. A tutorial, task-oriented help and a glossary of statistical terms will help make you an expert. You'll be surprised at how easy it is to do in-depth data analysis.

And, if you are already an expert, you'll appreciate SPSS' rich set of statistical functionality. Whatever your experience level, you'll be able to explore your data thoroughly.

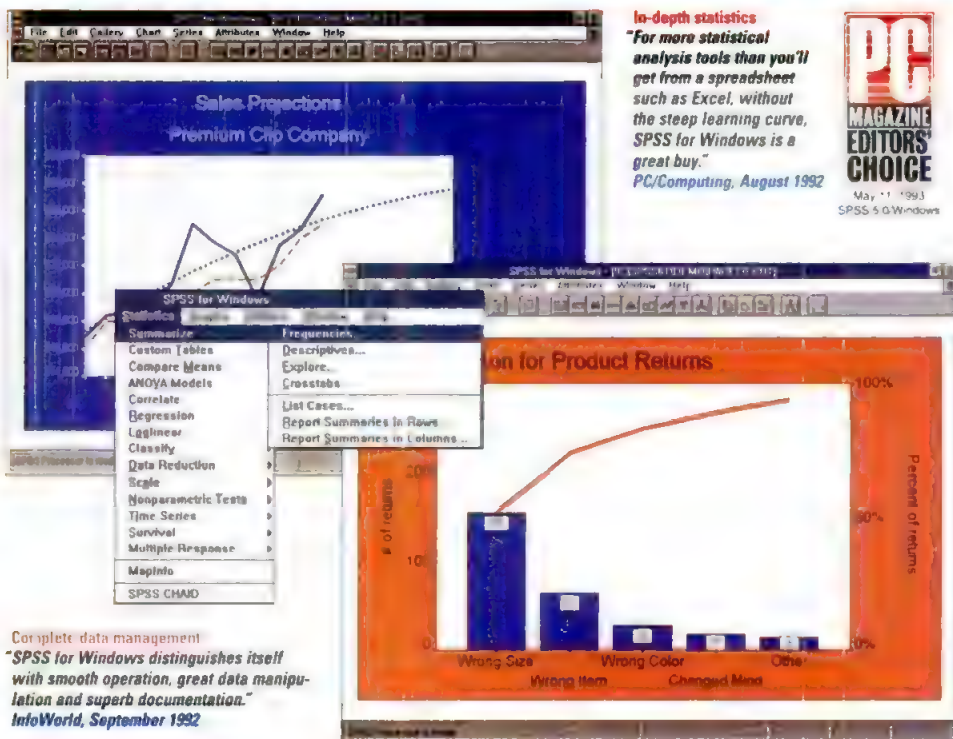
Discover hidden patterns and trends in your data with over 50 high-resolution business, analytical and SQC charts. SPSS saves you time by automatically aggregating your data and labeling your charts. Then, quickly add smoothing lines, confidence intervals and more to tell the full story in your data.

Call today to find out how to answer your tough questions every day with SPSS 6.1 for Windows!

Get a great value — order now!

Call (800) 543-5833

or Fax (800) 841-0064



In-depth statistics
"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy."
PC/Computing, August 1992

PC
MAGAZINE
EDITORS' CHOICE
May 11 1993
SPSS 5.0 Windows

Complete data management
"SPSS for Windows distinguishes itself with smooth operation, great data manipulation and superb documentation."
InfoWorld, September 1992

Automatic statistical graphs
"A complete set of graphics and charting capabilities." PC Week, May 1992

Learn fast, work fast
"SPSS for Windows is an excellent full-featured set of statistical procedures...The Windows interface makes it easy and fast to use and I highly recommend it." Marketing Research, Summer 1993

Reasons SPSS 6.1 for Windows goes beyond your spreadsheet:

- 80+ statistical procedures
- 30+ business, analytical and SQC charts with automatic labels
- New toolbar which gives you one-button access to statistics and commonly used functions
- Technical support for statistical help
- New online tutorial
- Statistical help system
- Glossary of statistical terms
- Fast 32-bit processing
- Hot buttons between graphs and tables
- Work with even your largest data sets
- Complete report writer

- View your data as words, while doing analysis with numbers
- Keep your formulas safe and separate from your data
- ODBC / OLE
- Statistics located in easy-to-understand menus and dialog boxes
- Easy, complete data editing and management in a spreadsheet-like format
- Documentation which clearly explains statistics
- Create charts with your analysis automatically
- Automatic labeling of results

Available add-on modules:

- Explore your data more thoroughly with techniques such as factor, cluster, discriminant analysis and much more with SPSS Professional Statistics™
- Execute advanced multivariate techniques such as Cox regression, Kaplan-Meier estimation, logistic regression and more using SPSS Advanced Statistics™
- Create camera-ready tabular reports with SPSS Tables™

- Predict the future using advanced time-series analysis in SPSS Trends™
- Perform perceptual mapping, conjoint analysis and optimal scaling procedures with SPSS Categories™
- Find predictors and build better models using SPSS CHAID™
- Analyze linear structural equations and simultaneous equation models using SPSS LISREL™

- Improve your operations with statistical process control using Qi Analyst™
- Build thematic maps with MapInfo™
- Plug components for stats, graphs and reports, complete with data management and output formatting, into your applications quickly and easily using QLE 2.0 Automation in the new SPSS Developer's Kit™. Provide both push-button statistical reports and interactive data analysis with access to all SPSS features



Get a great value — order now!

Call (800) 543-5833

or Fax (800) 841-0064

or mail to: SPSS Inc.
444 North Michigan Avenue
Chicago, IL 60611

American Express, Discover, MasterCard
and VISA accepted

Name _____
Title _____
Organization _____
Address _____
City _____ State _____
ZIP _____ email _____
Phone Number (____) _____
FAX Number (____) _____

Try SPSS 6.1 for Windows with our unconditional 60-day money-back guarantee

SPSS
Real Stats. Real Easy.

Chicago • Washington, DC • Boulogne • Chertsey • Gonnheim • Madrid • Munich • New Delhi • Singapore • Stockholm • Sydney • Tokyo • And Distributors Worldwide

THE POWER TO GO

...with the solutions to meet your needs.

SoundPro



Our Award winning TravelPro 5300 series has just gotten better. With added sound module and local bus I/O, the SoundPro is the clear winner.

- Choice of Upgradable Intel CPU's 486SX-25, DX-33, DX2-50, DX2-66, DX4-75 & DX4-100
- Available in upgradable Active Matrix, Dual Scan Passive or Monochrome Displays
- 4MB RAM - Upgradable to 32MB
- Local Bus Video & Local Bus HD I/O
- Center Trackball, PCMCIA Type III, 1.44MB Floppy and built in 16 bit sound module.
- Over 3 hours of Battery Life
- 5.9lbs. Monochrome - 6.3 lbs. Color
- 200MB Hard Drive (200 - 520MB Available)
- Includes AC Adapter, NIMH Battery, Carrying Case, External Speakers, MS Dos 6.22, Windows for Workgroups 3.11 & MS Sound System Software
- Optional Internal 14.4/14.4 Fax/Modem
- Optional Docking Station



DX4-75 Dual Scan Color
200MB HDD, 4MB RAM all & Accessories

\$2295



TravelPro 350

So many features... So little money



- Large Center Based 25mm Trackball With Palmrest
- Intel Low Voltage SX-33 CPU
- 9.5" Monochrome Display
- 4MB RAM Upgradable to 20MB
- Removable Hard Drive (200 - 540mb available)

- Unique Removable Keyboard for easy access to upgrades & International Keyboard Support
- Includes AC Adapter, NIMH Battery, Carrying Case, Internal 9600/2400 Fax/Modem with Comm. Software, MS DOS 6.22, Windows for workgroups 3.11

SX-33 Monochrome
200MB HDD, 4MB RAM all & Accessories

\$1295

CIRCLE 235 ON READER SERVICE CARD

**Corporate, Dealer
& Government
Pricing Available**



Intel Inside is a registered Trademark of Intel Corp. MS Dos & MS Windows are registered trademarks of Microsoft Corp. Not responsible for errors in advertising. Call for details on 30 day money back guarantee. restrictions apply.



1-800-868-8108

Hours of Operation: M-F 8:00 a.m. - 6:00 p.m. • Saturday 9:00 a.m. - 3:00 p.m. PST

AMS

The Power To Go

12881 Ramona Blvd. Irwindale, CA. 91706
Tel: (818) 814-8851 Fax: (818) 814-0782

No Surcharge on Credit Card Orders



**Finally,
computer TV
that doesn't
insult your
intelligence.**

TECHNOLOGY INFORMATION

N E T W O R K

**Two hours of television
about computer products.
Just for people like you.**

Your hunt for information about the latest computer products and trends is changing forever.

You can now turn on the Technology Information Network, four original, compelling weekly half hour TV shows that enable you to experience new products, see how they work, learn about their technical specs and features, and—best of all—buy the advertised products directly from us or via your local participating retailer.

**Four programs, each with
a unique focus**

PC Update—news you can use about the latest products, trends, applications. Draws upon the industry's most knowledgeable experts including Ziff-Davis' own editors, for opinion, evaluations, advice.

Inside Technology—3 to 7 minute product and solutions-oriented segments which explain the technology and guide viewers in making product selections.

The Personal Computing Show—real-life examples of personal computer use for education, entertainment, enrichment and home office applications.

The Computer Outlet—offering a dozen or more products for sale at great prices. Purchase from your home via an 800# or through participating local retailers.

**Produced by two of the greatest
names in the computer industry**



**Ziff-Davis
Publishing**

the leading provider of quality computer product information through magazines, newspapers, newsletters, books, CD-ROM products, on-line services, trade shows and conferences.



**MISSINGLINK
COMMUNICATIONS**

an affiliate of Intelligent Electronics, Inc., the nation's largest supplier of computer products and services.

Every week on CNBC, Jones Computer Network, America's Talking and many other stations.

Q: What's the best value for your marketing dollar?



A: Reprints, of course!

Dollar for dollar, you just can't beat a reprint of a great review; and there's never been a better time to order. Faster turnaround times and price incentives make this a great time to have your product review or advertisement reprinted. Why not call today? It really makes "cents!"

Contact: Marcia Hazell (212) 503-5412

Carol Peters, Reprints Manager; Ziff-Davis Publishing Company.

ZIFF-DAVIS REPRINTS

ONE PARK AVENUE 16th FLOOR NEW YORK NEW YORK 10016

MAGAZINE

The color showcase that puts the spotlight on leading-edge PC products and services.

An every-issue four color section featuring quality products for the Windows environment.

Flexible-format display
advertising: computer systems,
components, software and more.

A forum for innovative, hard-to-find and low cost PC hardware, software and services.

OCTOBER 25, 1994 PC MAGAZINE 383

ROM BIOS UPGRADES

Do you need new AMI, Award, MR BIOS or Phoenix BIOS?

Support Windows 3.1/Chicago
Support 1.2/1.44/2.88MB
Floppy Drives
User defined hard drive types
Enhanced IDE
100% IBM compatible
Hard drive support beyond 1K cylinders
32 bit block mode transfer
Four floppy support
Four serial port support
DOS 6.X
Three levels of password protection
Complete set up in ROM

**WE ARE THE OLDEST AND LARGEST
BIOS UPGRADER IN THE WORLD.
GUARANTEED LOWEST PRICES
ALL THE TIME.**

**ORDER TODAY!
1-800-800-BIOS**

MA, FL, CA OFFICES (2467)
RETURNS MAY BE SUBJECT TO A RESTOCKING FEE

**UNICORE
SOFTWARE**

1550 TURNPIKE ST. • NORTH ANDOVER, MA 01845
(508) 686-6448 • FAX (508) 685-1630

ACER AMI AST COMPAQ DELL DTK IBM EPSON EVEREX GATEWAY HITACHI KAYPRO LEADING EDGE
MICRONICS ORIENTEDGE SAMSUNG SANYO SPERRY TANDY WELLS AMERICAN WYSE AND MANY MORE

CIRCLE 752 ON READER SERVICE CARD

RE-BOOT

Call for info. or a
FREE DEMO DISK
800-835-1915 U.S.
408/745-0300
Fax 408-745-0392

Technical Support & Driver (VGA) Updates
Using the SENTRY Remote Power Manager



FREE TRIAL OFFER
When your remote Router, Modem, Gateway or Access Server gets locked-up RE-BOOT IT using the SENTRY Remote Power Manager

Using an ANSI emulator, a network administrator, calls the sentry, enters a password and receives an on screen menu. From the menu individual ports can be toggled "power-off" or "power-on" to re-boot locked-up mission critical network devices. The sentry supports 4 companion power modules which control the A/C power flow to each network device.

SERVER TECHNOLOGY 1988 Hammerwood Ave., Sunnyvale, CA 94089

CIRCLE 755 ON READER SERVICE CARD

TARGET YOUR PREY!



**Bag Your
Voice Processing
Objective**

- ◆ VOICE MAIL
- ◆ AUTO-TRANSFER
- ◆ FAX-ON-DEMAND

Complete your mission
for as little as \$295.

CALL 1-800-945-4884

510-522-3800 • FAX 510-522-5556
We target developers/OEMs

TALKING TECHNOLOGY, INC.
1125 Atlantic Ave. • Alameda, CA 94501



CIRCLE 753 ON READER SERVICE CARD

**"PC Magazine Marketplace
is the place where buyers
look when they're ready to
buy."**

Mike Strand, President
StrandWare, Inc.
bar coding

Write your own PC Magazine testimonial and put your
ad here...Start advertising now!

Call 800-825-4237 today.

**Add a second keyboard,
monitor and mouse to your PC
up to 250 feet away!**

- Supports PC/AT, PS/2 and 100% compatibles
- Combine monochrome and color VGA monitors
- Mouse support available at both local and remote workstations
- Switch selectable privacy mode



PC-COMPANION Plus™

**Extend the distance between
your PC and a keyboard, monitor,
and mouse up to 250 feet!**

- Supports PC, PC/XT, PC/AT, PS/2 and 100% compatibles
- Supports monochrome or color VGA monitors
- PS/2 style or Microsoft/Logitech serial mouse support available
- Offers conversion from RGB color to gray-scale



PC-EXTENDER Plus™

PC, PC/XT, PC/AT and PS/2 are registered trademarks of IBM Corp. Macintosh is a registered trademark of Apple Computer, Inc. Microsoft and Logitech are trademarks of their respective companies.



CYBEX™

Cybex Corporation
4912 Research Drive • Huntsville, AL 35805 USA
(205) 430-4000 • FAX (205) 430-4030

For Macintosh support, ask about
our new **Mediator™** for Macintosh!

CIRCLE 754 ON READER SERVICE CARD

Smart Power at Your Fingertips

SmartBook II The Ultimate Business Power Notebook

486SX-25/33
486DX-33
486DX2-50/66
SL Enhanced
Upgradeable CPU

Upgradeable
RAM and HDD
Up to 32MB Memory
Up to 524MB HDD

Built in Sound
Capabilities for
Multimedia

DX2-66

32MB RAM
524MB HDD



Audio Speaker
& Microphone

1MB
Video

- 8.9" Upgradeable
LCD Panel
- VESA Local Bus Video
- 1 MB of video memory

Double Your Battery
Life Up to 8 Hours

Rechargeable
Battery

Ergonomically
Designed Keyboard
with Huge 25mm
Trackball Mouse

PACKED WITH POWER!

- Powerful - 486 SL Enhanced CPU
- Long Lasting - Double NiMH Batteries up to 8 Hours
- Fast - VESA Local Bus Video and 1MB Video Memory
- Flexible - Up to 32MB RAM and 524MB HDD

Active Matrix.....\$3,225
Dual Scan\$2,250
Monochrome.....\$1,690

STANDARD FEATURES

- 4MB of RAM Standard
- 120MB Upgradeable HDD
- PCMCIA Expandability
- Built-in Audio Capability
- Rechargeable Battery
- IBM PC-DOS 6.1
- Windows 3.11
- Carrying Case
- Optional Docking Station, Fax Modem, Lan Adapter

COMMAX
TECHNOLOGIES, INC.

1-800-5-COMMAX

2031 Concourse Drive, San Jose, CA 95131
In Calif: (408)435-5000 • FAX:(408)435-5005

East Coast Distributor:

Hi-Link
933 Hope Street
Stamford, CT 06907
1-800-683-9535



The Intel Inside logo is a registered trademark of Intel Corporation. Price and configuration subject to change without notice.

CIRCLE 756 ON READER SERVICE CARD

100MHz PowerBrick

Have Your Power and Take It Too!

For no compromise on-the-go use, the PowerBrick is the fastest, most capable notebook available. Enjoy blazing performance with the latest 100MHz 486DX4 CPU and the mobility of a light 6lb PC. Other features include 4-32MB RAM, accelerated local bus graphics and hard disk with up to 525MB of capacity (1GB with Doublespace). The backlit 9.5" LCD is available in mono, Dual Scan or Active Color and all feature 1280x1024 ext. VGA. For expansion, two PCMCIA Type II cards plus an internal 14-14 fax/modem can be utilized while the expansion chassis holds two full length ISA cards.

from **\$2,295**

**4-Year GE Service
Warranty Included**



Other New NoteBricks

The Color SubBrick 50

50 MHz 486DX2, Dual Scan Color,
3 9 lbs 7" x 10" x 1.4" thick, 2 Type
II PCMCIA, 260MB HD, up to 20MB
RAM, 4 Hr. Battery life -
from **\$2,495**

Call M-F, 9-6 EST

800-633-1925

The Ergo Difference!

- 4-year warranty
- Same day shipment
- RescueMe next day loaner
- Affordable leases
- Satisfaction guaranteed

24Hr. Automatic FAX Info
800-723-0778
code 1485

One Intercontinental Way, Peabody, MA 01960 (508)535-7510 FAX (508) 535-7512

CIRCLE 757 ON READER SERVICE CARD

#1 Notebook in the World

PC
Editors
Choice

486 DX4/75 Mhz
SL Enhanced Intel 486 DX4/75 CPU
Upgradeable 1, 3, 5 MB
Upgradeable 1, 500 MB Hard Drive
3.5" 1.44 MB Floppy Drive
Built-in Speakers
1 Type II, 2 Type III PCMCIA Slots
WD Rooker Chip Video Accelerator
VESA Local Bus Video and IDE
NiMH Battery and AC Pow.

	\$1945	\$2695	Pentium
486 DX4/75 Mhz	486 DX4/75 Mhz	486 DX4/75 Mhz	Pentium 60 Mhz
Dual Scan Color	Dual Scan Color	Dual Scan Color	Dual Scan Color
4 MB RAM	8 MB RAM	5 MB RAM	5 MB RAM
120 MB HDD	340 MB HDD	340 MB HDD	340 MB HDD

Options: Active Matrix Display, Docking Station
14.4 Internal Send/Receive Fax/Voice Data Modem

\$3795

Just Imagine 1-800-363-8180

A Division of TFE Industries Inc. Me., U.S.A. - N.B., Canada Est. 1983

CIRCLE 758 ON READER SERVICE CARD

8-64 Serial Ports in a PC

Blackboard-4 BBS550 SmartCard-8



- 4 Ports with 16550 UARTS
- BBS Guardian Watchdog circuit resets the computer if the system crashes
- Data rates up to 460,800 BPS
- Works with SIO, XOO, BNU, Desqview, UNIX, Windows and all popular BBS Software

- 8 Ports with 16550 UARTS
- Digiboard PCX Compatible
- Works with all popular BBS Software
- Works with SIO, XOO, BNU, Desqview, UNIX, Windows
- Flexible interrupt and addressing structure

- A high-speed channel (up to 1.5, 200 IOPS)
- Dynamically allocated FIFO memory is thousands of times larger than the FIFO in a 16550 UART
- BBS Guardian Watchdog Circuit
- FOSMIL Windows and Infil drivers included

GTEK

Contact your local computer dealer or call

800-282-4835

PO Box 2310 Bay St. Louis MS 39521 Phone: (601) 467-8048 Fax: (601) 467-0935
All product names or company names are the respective holders.

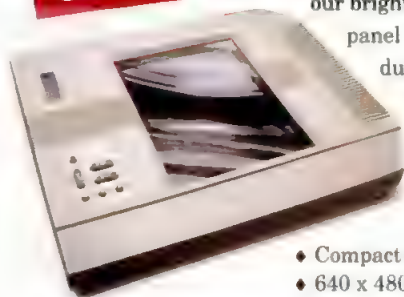
CIRCLE 759 ON READER SERVICE CARD

Bright color. Bright price.

\$2,299.

SPECIAL OFFER!

The New **BOXLIGHT ColorShow 1200** Projection Panel. Call now and order our brightest true-color LCD panel at the special introductory price of only **\$2,299**. It's an unbeatable value-guaranteed.



- Compact & portable
- 640 x 480 resolution
- PC and MAC compatible
- Free remote and cables

Your direct source for all the bright answers.

- Widest selection
- Instant availability
- Overnight shipping
- 30-day guarantee

BOXLIGHT CORPORATION

17771 Ford Dr. N.E., Poulsbo, WA 98370
206/779-7501 • Payment: VISA, MasterCard, American Express, COD and Purchase Orders
www.boxlight.com • Low price and fast shipping guarantee • 30-day Money Back Guarantee

Call Today 1-800-762-5757

CIRCLE 780 ON READER SERVICE CARD

9 TRACK/3480/CDROM

WINDOWS DOS NOVELL OS2 UNIX

WINDOWS TAPE SOFTWARE!
TAPE BACKUP/CONVERSION
TAPE DUPLICATION
CD ROM MAKER



LAGUNA DATA SYSTEMS

7340 Smoke Ranch Road Suite C,
Las Vegas, NV 89128
TEL: (702) 254-2648 FAX: (702) 254-0910

800-938-TAPE

CIRCLE 761 ON READER SERVICE CARD

Will your 9-Track Subsystem...



- ✓ Offer tape speeds from 100 to 150 ips?
- ✓ Read and Write all four 9-Track Densities?
- ✓ Work in concert with other SCSI-2 devices?
- ✓ Be backed by a company who has produced 9-Track drives for over 20 years?

Features like these make **M4's** solutions the only choice for your demanding high performance applications.

....3480/90 Solutions also in-stock

M4

10855 Sorrento Valley Rd. San Diego, CA 92121
619-597-0516 Fax: 619-597-0636

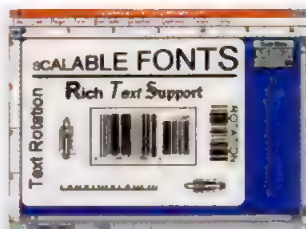
800-240-8270

8 AM Eastern to 5 PM Pacific

CIRCLE 782 ON READER SERVICE CARD

The Next Generation in Label Design Software

LabelWorks™ for Windows



LabelWorks sets the new performance standard for professional quality label design. No other program combines such easy operation with this much power!

- Provides Desktop Publishing features to enhance label design. Features include: WYSIWYG, rulers, guides, page zooms, lines, shapes.
- Rich text support allows you to edit font styles, types, and sizes within the same line.
- Supports all major Bar Code symbologies, including Code 39, 93, 128, POSTNET, UPC, Bookland EAN, 19 types in all.
- Imports & Exports using TIFF, GIF, BMP, PCX, WPG, WMF, TARGA graphic files.
- Rotates Text, Bar Codes and imported graphics in 90 degree increments.
- Prints labels on virtually any windows supported printer.
- Prints labels directly from dBase, DIF & ASCII files.

Dealer Inquiries Welcome.

Call for Free DEMO Software



AMERICAN MICROSYSTEMS

2190 Regal Parkway, Euless, TX 76040

(800) 648-4452 (817) 571-9015 FAX (817) 685-6232

PCs, Workstations

9-Track
Incredibly compact, super reliable.
1600, 6250 bpi. Great price!

3480
Smallest, lightest in the world,
super reliable. Low price!

800-729-8725
Includes software,
PC controller

Overland Data
Your best choice for 1/2 inch
tape solutions since 1980

619-571-5555
FAX 619-571-0982
Europe (+44) 734-891891
FAX (+44) 734-891897

CIRCLE 763 ON READER SERVICE CARD

New Products Expand Award Winning Tape System Family!
3480/3490/3490S/3490S2/3490S3/3490S4/3490S5/3490S6/3490S7/3490S8/3490S9/3490S10/3490S11/3490S12/3490S13/3490S14/3490S15/3490S16/3490S17/3490S18/3490S19/3490S20/3490S21/3490S22/3490S23/3490S24/3490S25/3490S26/3490S27/3490S28/3490S29/3490S30/3490S31/3490S32/3490S33/3490S34/3490S35/3490S36/3490S37/3490S38/3490S39/3490S40/3490S41/3490S42/3490S43/3490S44/3490S45/3490S46/3490S47/3490S48/3490S49/3490S50/3490S51/3490S52/3490S53/3490S54/3490S55/3490S56/3490S57/3490S58/3490S59/3490S60/3490S61/3490S62/3490S63/3490S64/3490S65/3490S66/3490S67/3490S68/3490S69/3490S70/3490S71/3490S72/3490S73/3490S74/3490S75/3490S76/3490S77/3490S78/3490S79/3490S80/3490S81/3490S82/3490S83/3490S84/3490S85/3490S86/3490S87/3490S88/3490S89/3490S90/3490S91/3490S92/3490S93/3490S94/3490S95/3490S96/3490S97/3490S98/3490S99/3490S100

NOW all of the features of the PCTD product family that earned PC Magazine's praise — "has an excellent nine-track tape system for PCs," says Frank Dertler Jr. PCMagazine July 1992. Available is a complete line of NineTrack 3480/3490 SCSI Controller Kit and tape subsystem solutions. Like the PCTD line, the new SCSI line reads/writes to 9-track and 3480/3490 tape with your IBM PC/XT/AT 386, 486, PS/2 and compatibles. Exchange data with other PCs, minis and mainframes using a variety of tape densities.

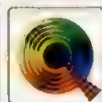
3480/3490 (IDRC) & NineTrack system features:

- Auto & manual operation
- Data transfer up to 400 MB/min
- Interchangeable back-up & restore
- Real-time data verification & error correction
- 800/1600/3200/6250 bpi & 3480/3490 (IDRC) systems available
- Toll-free direct access to dedicated technical support

CHI

800-828-0599
Fax 216 349-8609

CIRCLE 764 ON READER SERVICE CARD



SyQuest

TECHNOLOGY

Unlimited data storage at blazing 13 ms access speed and up to 4 MB/s transfer rate. Wake up DOS & Windows world to the SyQuest storage technology that dominates the media service bureau industry with a 98.5% penetration. It obliterates optical technology with its speed and low cost. Can you imagine 270 MB on a disk the size of your floppy diskette. Available in the Liberty small form factor (shown left) with or without internal battery or as an internal kit for your PC. Never run out of storage again, throw away those slow back up tapes and be on line immediately.



375A Saratoga Ave.
San Jose, CA 95128

(408) 983-1127
Fax (408) 243-2885

Supply Drives

CIRCLE 765 ON READER SERVICE CARD



CDROMS!



Cica MS Windows CDROM 4000 programs, games, utilities, drivers - quarterly updates. **\$29.95***
Giga Games CDROM 3000 hot games - arcade, adventure, card, etc. MSDOS/Windows. **\$39.95***
Space and Astronomy CDROM 1000 NASA images + viewer, 5000 data files, programs. **\$39.95***
C User Group Library C User Journal Archive: 10 years C source code & articles. **\$49.95***
Simtel MSDOS CDROM Now TWO disc set: 1000 MB Shareware / Freeware for MSDOS. **\$34.95***
Gifs Galore CDROM 6000 vivid, mostly 640x480 GIF images in every category. **\$39.95***
Project Gutenberg CD Famous internet project: ASCII classic literature & documents. **\$39.95***
Hobbes OS/2 CD OS/2 Mag product of the year! 600 MB current Free & Shareware. **\$29.95***
Ready-To-Run Hobbes CDROM Installed OS/2 emacs, gcc, 2.1 service pack & more. **\$39.95***
Source Code CDROM 650 MB mostly C, usenet Unix & DOS source code. **\$39.95***
Internet Info CDROM 12,000 internet, net & computer doc's. FAQ's, RFC's & IEN's. **\$39.95***
X11R6 CDROM Official X consortium X Windows for Unix. Sun binaries! Src. **\$39.95***
Gnu CDROM 250 GNU programs. Binaries for SunOS 4.1.3 & Solaris 2.3. Src. **\$39.95***
Ada CDROM Ada compilers (DOS, 4 unix's), tons of src & docs. 600 MB. **\$39.95***
Nebula for NeXTSTEP Intel 600 MB NeXTSTEP Intel applications's, docs, source, etc. **\$59.95***
Garbo MSDOS/Mac From Finland. 350 MB MSDOS & 150 MB Macintosh Shareware. **\$29.95***
Fractal Frenzy CDROM 2000 beautiful fractals & history - royalty free. Mac/DOS. **\$39.95***
Linux CDROM Yggdrasil Linux. Easy install. 32bit OS for PC, w/ GNU & X11. Src. **\$39.95***
Toolkit for Linux CDROM Two disc set: Slackware 2.0 + two entire internet archives. **\$39.95***
CDROM of CDROMs 7037 CDROM title descriptions + reviews + samples. DOS/Win. **\$39.95***
Clipart Cornucopia CDROM 5050 images in all categories. WordPerfect, PCX format. **\$39.95***
Ultra Mac Games CDROM New 520 MB collection. Best games & runs direct from CD. **\$39.95***
Beer Home Brewing CDROM A complete reference and tutorial on brewing beer. **\$49.95***
Welcome to Africa CDROM Discover the Africa I cherish. 450 picture tour & game. **\$39.95***
Scientific Library CDROM Only technical, astro, elec., etc. shareware + book. DOS/Win. **\$39.95***
CDROM Caddies Protect your CD's! Standard type, highest quality. Lifetime guarantee. **\$4.95***

* Shareware programs require separate payment to authors if found useful

CALL NOW! 1-800-786-9907

+1 510 674-0783

Email: orders@cdrom.com

Fax +1 510 674-0821

Walnut Creek CDROM

4041 Pike Lane, Suite D-513
Concord CA 94520



Dealer Inquiries Welcome

CIRCLE 766 ON READER SERVICE CARD

Tape Solutions

QUALSTAR

...The Tape Experts

- Top Quality
- High Performance
- Proven Reliability
- Easy to Use
- Best Price
- Total Support
- Factory Direct
- Made in the U.S.A.

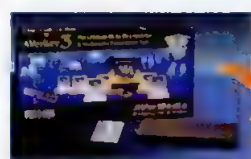
9-TRACK #
3480/3490

Data Interchange for
DOS, NOVELL, UNIX,
WINDOWS AND OS/2



6709 Independence Ave.
Canoga Park, CA 91303
FAX (818) 592-0116
Tel (818) 592-0061
Tel (800) 468-0680

CIRCLE 766 ON READER SERVICE CARD



PC Screen to TV Screen
800 x 600 Resolution
Horizontal & Vertical Underscan
Zoom & Pan, Screen Freeze
Remote Control

AverKey3

\$499.00

1-800-863-ADDA

ADDA TECHNOLOGIES, INC.
48501 Warm Springs Blvd.,
Suite #109, Fremont, CA 94539

Why settle for less... Go for the Best!!
If you have been looking for the best
VGA-to-TV Scan Converter, ADDA
has the answer for you. AverKey3
is a true "Plug-and-Go" device with
no software drivers required. It
incorporates all the features you have
been asking for and supports up to
800 x 600, 16.7 million colors

*Ask for ADDA's AverKey converter
for low cost alternatives

USA Tel 510-770-9899 Fax 510-623-1803
Canada Tel 604-278-3224 Fax 604-278-2989

MULTIMEDIA AUDIO

TWIN SOUND
Slip-In Stereo Speaker



- Fits any unused 5 1/4" PC drive bay
- 100% shielded high quality speakers
- Works with all sound cards & CD-ROMs
- No messy desktops
- FCC Class B certified

"...Twin Sound has to be one of the most practical
and intelligent PC hardware products...in a
long time. This is a wonderful product whose time
has come."
(PC Review Oct/Nov 1993)

WinRadio .fm

\$89
(Plus \$6.95 S&H)



- View of Control Panel in Windows
- Plug-in digital FM Radio Card
- Runs under Windows and DOS
- 10 Preset Channels
- Auto Scan/Fine Tuning
- Wake-up and Sleep Functions

Super Deal
1-800-832-7070
Each sold separately at \$54.95.

SOUND MINDS

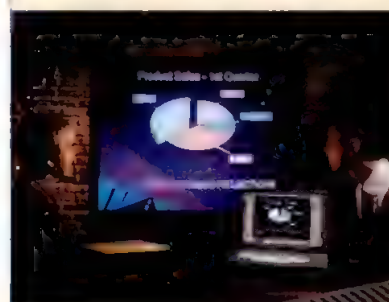
Technology Inc
1400 Dell Ave #5, Campbell, CA 95008
Ph (408) 374-7070 Fax (408) 374-7193

Email orders:
Internet: smc@ix.netcom.com
C'serve: 74643.2415 @Compuserve.com

CIRCLE 767 ON READER SERVICE CARD

Connect Your PC to any TV...

The Compact PC Presentation Solution



\$349

Available with Presenter Plus 2 for \$399
Support: DOS, Windows, and Mac

FREE Eveready MarketScan by cassette tape

The Presenter Plus/2 —
When your presentations count!

800/356-3931

The Presenter Plus 2 turns
your PC into an incredible
presentation machine. Easy
plug and play external
hook-up makes group
presentations much more
efficient and certainly less
expensive. Print to video tape
so others can share your
presentation. Forget carrying
heavy equipment to your
presentation.
That's his story.
Why did the
lights? That's
his overhead projector
a soft story. So with your PC
and The Presenter Plus/2 in
your briefcase use the
available TV and you're ready
for that Academy Award
performance.



CONSUMER TECHNOLOGY

For questions and a dealer nearest
you, call us at 800/356-3931
Fax: 800/356-3931

MASS STORAGE DEVICES - MULTI-MEDIA

TV Elite. Big-Screen Multimedia Presentations Made Easy.

Just connect TV Elite to a VGA card and any TV and presto!...big-screen presentations. It's that simple.

Compare TV Elite's features to any of the alternatives (all unwieldy and costing up to 10 times as much), and you'll see—there simply is no other choice.

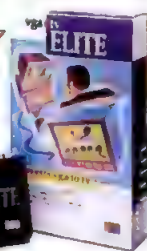
FREE! With every TV Elite, you get "Compel PE". And you get "Presentation Tools" software—with 3 great presentation features.

Advanced Digital Systems

Call (800) 888-5244. 8am-5pm M-F Pacific Time
13909 Belvedere Court • Cerritos, CA 90701 • (310) 926-1928 • (310) 926-0518 (Fax)

TV Elite.
Easily the Best.

FEATURES
640x480 resolution
16.7 million colors
Flicker-free video
Light weight



CIRCLE 770 ON READER SERVICE CARD

**"We convert more than 85% of
inbound customer calls from PC
Magazine Premier."**

Pierre A. Narath, President
Unicore Software, Inc.

Write your own PC Magazine testimonial and put
your ad here...Start advertising now!

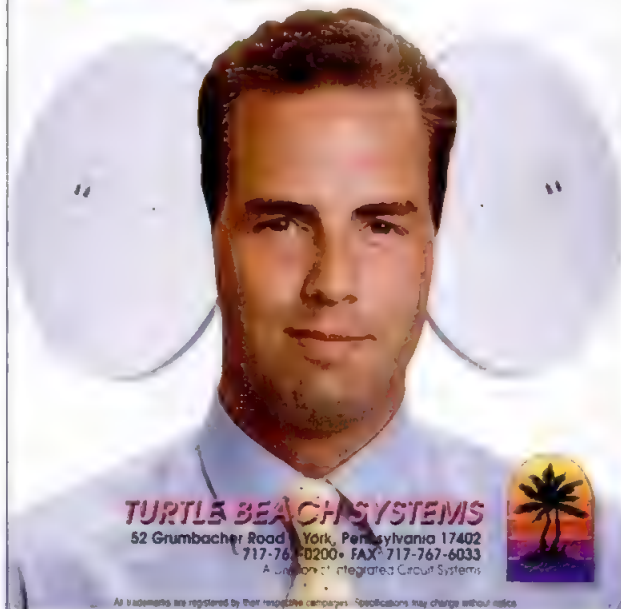
Call 800-825-4237 today.

**When You Said All You Really Ever Wanted in Life
Was Turtle Beach Quality And Game Compatibility
In One Sound Card, We Were Tuned In!**



Tropez™ is here and it's everything you ever wanted... stereo, 16-bit, pro quality digital audio. SampleStore™, the Wavefront™ Wavetable synth and a CD-ROM interface. Everything but the kitchen sink for just \$249.00!

See your favorite dealer, or call **800-845-5840** today for more information or the Turtle Beach demo CD!



CIRCLE 772 ON READER SERVICE CARD

Share More.



**NOW INCLUDES
File Transfer and
Print Spooling
Software**

The most flexible printer sharing solution available just became more productive! Now, you can connect up to 32 computers to as many as 8 printers and have file transfer and printer spooling capability at no additional cost. Installs in minutes using standard RJ-11 phone cable.

Call These
Distributors:

SED
1-800-444-8962
800-FAX-2358

UNIMAX
1-800-825-7904
1-800-331-3841 (Fax)

UNIMAX
1-800-4-CABLE-1
1-800-422-2531

PRIMAX
PRIMAX ELECTRONICS

CIRCLE 771 ON READER SERVICE CARD

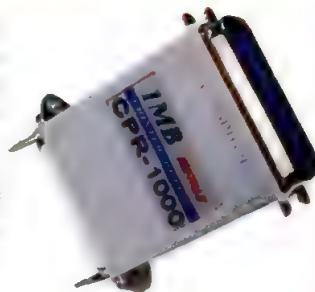
POWER PRINTING - 150,000 cps



Plug the BuffPort™ into your PC and print to any parallel printer or device. Transfer data from your PC as fast as the printer can accept it, up to 150,000 cps. (A standard PC parallel port is typically limited to about 10,000 cps.) Use the BuffPort with the HWP for a 150,000 cps printer sharing system!

If you have an older printer that does not have an high-speed interface, then connect a CPR buffer to the end of your printer cable and send from the BuffPort at 100,000 cps. The CPR also works as a printer buffer with a standard PC parallel port, but would be limited to the PC port's speed.

BUFFALO is a registered trademark of Melco, Inc. BuffPort is a trademark of Buffalo, Inc.



SIMMs:

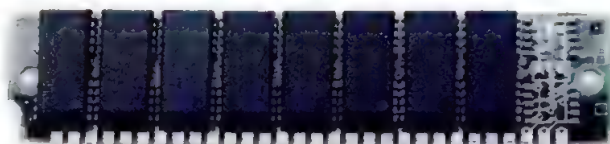
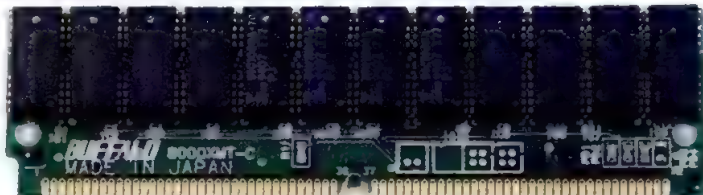
1 x 36 & 32

2 x 36 & 32

4 x 36

4 x 8, 1 x 3

PCMCIA



2805 19th St. SE, Salem, OR 97302-1520 FAX: (503) 585-4505

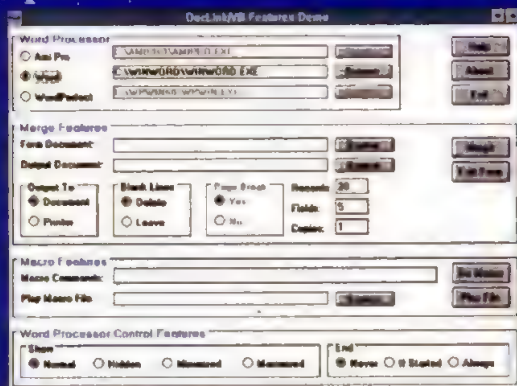
Printer Sharing:

SL 6 ser. & 4 par.
SLP 2 ser. & 8 par.
HWP 5 parallel ports
HXM 2 ser. & 2 par.
HXS 4 serial ports
ASB 5 parallel ports

(800) 345-2356

CIRCLE 773 ON READER SERVICE CARD

Link your applications to a word processor with DocLink/VB



You'd like to integrate your applications with a Windows-based word processor. But you don't have time to write tons of code. Your solution? DocLink/VB™.

This VBX custom control provides the connection you need to WordPerfect®, Microsoft® Word, and Lotus Ami Pro®.

It takes just a few lines of code to get full word processing functionality, including macros and merges, within your application. And users can select their favorite word processor. No runtime royalties.

800-380-1000
or FAX: 708-778-0174



NAPIERSOFT®
Software Tools for Document Automation

NAPIERSOFT, Inc. • 40 Shuman Blvd., Naperville, IL 60563-8466 • 708-778-0080

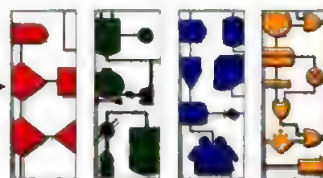
NapierSoft is a registered trademark, and DocLink/VB is a trademark of NapierSoft, Inc. All other brand or product names are registered trademarks or trademarks of their respective companies.

CIRCLE 774 ON READER SERVICE CARD

EasyFlow®

Easier
than ABC!

...the **EASIEST** flowcharter
...the most **ADVANCED** charting technology



Five reasons to buy EasyFlow

- SmartLines™ route & reroute themselves
- Text formats to the contour of shapes
- Text moves when lines move
- Print diagrams up to 10' by 10' in wall or binder format (with automatic off-page connectors)
- Drag & drop editing saves hours in revisions



See Us! or call
1-800-267-0068
(613) 541-0035

EasyFlow is a registered trademark of SmartLines Inc.

CIRCLE 775 ON READER SERVICE CARD

"YOU MUST BUY THIS..."

one of the few CD-ROM sets I keep on my desk."

- John Dvorak, PC Magazine



PhoneDisc. America's Phone Book on CD-ROM!
Experience the amazing ease of PhoneDisc, the product that the experts can't stop talking about! This outstanding collection of directory listings offers instant access to more than 91 million businesses and residences nationwide. Updated and cross-referenced quarterly, no other CD-ROM directory can match PhoneDisc's accuracy. Undoubtedly, the most comprehensive telephone directory of its kind!

Visit your local PhoneDisc retailer or call 1-800-284-8353 to order!

International orders, please call (617)639-2900

Digital Directory Assistance 6931 Arlington Road, Suite 405, Bethesda, MD 20814

CIRCLE 776 ON READER SERVICE CARD

Video Training... at Your Fingertips!!!
No Need for a TV or VCR-Plays on CD-ROM

ViewTrain International
Presents
CD-ROM Interactive Video Training
(Integrated Add-On Product)



WINDOWS® (only)
WordPerfect® 6.0
Lotus® 1-2-3® 4.0
MS-Word® 6.0
MS-Excel® 5.0
Specifications: Windows Version 3.1
256 Color Display
CD-ROM
Sound Card

\$99 a Copy

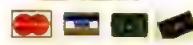
For more information please call 800-279-8970

CIRCLE 778 ON READER SERVICE CARD

Free Demo!

Do you have a CD Rom Player? ☐
Do you have a Sound Card? ☐
Do you own any of the 4 Products that are listed? ☐

If you answered YES to these questions, you should try CD-VIEW!



LaSalle Technologies, Inc.
4945 E. Downing, Mesa, AZ 85205
Fax: 602-996-4767

Internet Address: 74672.477@compuserve.com

"PC Magazine Marketplace is the place where buyers look when they're ready to buy."

Mike Strand, President
StrandWare, Inc.
bar coding

Write your own PC Magazine testimonial and put your ad here...Start advertising now!

Call 800-825-4237 today.



Video Training for Windows Applications

Your Personal Windows Training Specialists

Special Microsoft Office Video Training

Microsoft Office 4.0 Standard (11 videos/13 hours).....\$299.95
Microsoft Office 4.0 Pro (13 videos/24 hours).....\$495.95
Microsoft Office 4.0 Plus (15 videos/27 hours).....\$579.95

Special Lotus SmartSuite Video Training

Lotus SmartSuite 2 Standard (7 videos/13 hours).....\$299.95
Lotus SmartSuite 2 Pro (13 videos/24 hours).....\$495.95
Lotus SmartSuite 2 Plus (15 videos/27 hours).....\$579.95

Special Borland Office Video Training

Borland Office 2.0 Standard (11 videos/13 hours).....\$239.95
Borland Office 2.0 Pro (13 videos/17 hours).....\$349.95
Borland Office 2.0 Plus (15 videos/21 hours).....\$429.95

Average 1 hour & 45 minutes of instruction per video



MS Office Integration Video

\$19.95 when purchased with any MS Office Combination (Reg. \$49.95)



Dawn Bjork
Corporate Trainer
& MS Word Instructor

Word 6.0

Reg./Int./Adv. (ea) \$49.95
Desktop Publishing \$49.95
Mini Release/Forms \$49.95
Any Three Videos \$149.95

PowerPoint 4.0

Reg./Int./Adv. (ea) \$49.95
Any Three Videos \$149.95

WordPerfect 6.0

Reg./Int./Adv. (ea) \$49.95
Desktop Publishing \$49.95
Any Three Videos \$149.95
5.2 to 6.0 Upgrade \$49.95

Many Other Titles Available
Call for Details



Dave Bellamy
MS Excel Specialist
& MS Excel/Project Instructor

Excel 5.0

Beginning \$49.95
Intermediate \$49.95
Advanced \$49.95
Any Three Videos \$149.95

Project 4.0

Level 1/Int/Adv (ea) \$79.95
All Three Videos \$249.95

Lotus 1-2-3 Release 4

All Three Videos \$129.95

Ami Pro 3.0

Reg./Int./Adv. (ea) \$49.95
All Three Videos \$149.95



Alison Balter
Access 2.0 Instructor
& Microsoft Access Instructor

Access 2.0

Reg./Int./Adv. (ea) \$49.95
All Three Videos \$129.95
All Three Videos \$149.95

Visual Basic 3.0

Unit 1/2/3 (ea) \$89.95
All Three Videos \$249.95

VB for Apps

Level 1/2/3 (ea) \$79.95
All Three Videos \$249.95

Paradox 4.5

Reg./Int./Adv. (ea) \$49.95
All Three Videos \$129.95



Mark Wright
Windows 3.1 Instructor
& MS Windows Instructor

Windows 3.1

Beginning \$49.95
Advanced \$49.95
Begin/Adv. Set \$89.95
DOS & Win Basics \$49.95

CorelDRAW 4

Reg./Int./Adv. (ea) \$59.95
All Three Videos \$149.95

Quicken 3.0

Basics \$49.95
Power Features \$49.95

PageMaker 5.0

Reg./Int./Adv. (ea) \$49.95
All Three Videos \$129.95

KEYSTONE
Learning Systems Corp.

3 Easy Ways to Order:

C.O.D., Company P.O. or Checks



CALL ▶ 1-800-748-4838

FAX ▶ 1-801-375-8680

MAIL ▶ K.L.S. Corporation
2181 Larsen Parkway
Provo, UT 84606

CIRCLE 777 ON READER SERVICE CARD

The Most Elaborate Interactive Movie Ever Created Will Blow You Away!

ACCESS
SOFTWARE INCORPORATED



Three Big CDs! Almost 2 gigabytes of gaming fun! (Were this put on floppies it would take almost 1250 HD disks!)

■ Stars Hollywood actors Brian Keith, Margot Kidder, Russell Means, and the voice of James Earl Jones! ■ Features a virtual reality engine that will amaze you with its realism! ■ Unparalleled graphics and freedom of movement. ■ Features a rich original musical score, high quality digitized voices and sound effects making this Interactive Movie as aurally exciting as it is visually stunning! Call 1-800-800-4880 for details.

CIRCLE 779 ON READER SERVICE CARD

FAST, PAINLESS MULTIMEDIA PRESENTATIONS

Professional multimedia presentations shouldn't require hard-to-learn software, days of time, or thousands of dollars. Midisoft® Presentation Partner™ automatically generates multimedia presentations for playback within most popular Windows presentation software—PowerPoint, Freelance Graphics, Harvard Graphics, Action!, and SST.

• Three-step process creates professional multimedia presentations in minutes

- Includes dozens of complete multimedia presentations for many different business and personal occasions
- Large library of clip media makes it easy to personalize your presentations
- Includes tools for editing audio and adding narration
- Only \$149.95 SRP



Free Presentation Partner Demo CD-ROM

\$4.95 shipping and handling. Visa and MasterCard. (Demo disk requires CD-ROM drive, Windows 3.1, one of the 5 presentation programs listed above, sound card, 486 PC, 16MB RAM, and 10MB available space on hard drive)

1-800-776-6434 (8:00 A.M. - 5:00 P.M. Pacific Time)



Midisoft Corporation
P.O. Box 1090
Bellevue, WA 98009
206/881-7176 Tel
206/883-1468 Fax

CIRCLE 780 ON READER SERVICE CARD

P I N B A L L

This award winning Macintosh title is now available for Microsoft® Windows. From the developer of **TRUSTAN™** and **Eight Ball Deluxe™** for the Mac.

Available from your favorite catalog, retail store, or call (800) 293-2503 to order. List \$49.95

Arcade Game of the Year™
-Inside Mac Games

Electronic Entertainment

Crystal Caliburn

StarPlay Productions, Inc. • Box 217 Greeley, CO 80632 • Tel (303) 447-3502

Quick and Easy Spanish

NEW! Interactive multimedia program teaches Spanish grammar, alphabet, numbers, common vocabulary, phrases, everyday expressions, brief stories, questions and answers using natural voice, video clips, color pictures and plenty of exercises. This award-winning product includes nearly 2,000 screen pages and is value-priced. **30-day money back guarantee.** Don't wait, call today. Thank you.

\$29.95
CD-ROM or Disk Version

SoftBooks, Inc.
22651 Sanborn Street
Suite 101A
Lake Forest, CA 92630

1-800-513-4111
7 days a week 24 hours a day

(714) 586-1284
M-F 9am-5pm PST

CIRCLE 781 ON READER SERVICE CARD

Cakewalk

home studio



Turn On, Play In, Print Out.

With **Cakewalk Home Studio™**, making music on your PC has never been easier. Play along with MIDI files. Improve your musical skills.

Create and print original compositions. Even add voice or sound effects to your MIDI tracks for multimedia presentations.

- 256-track MIDI sequencer for Windows 3.1
- Works with sound cards and MIDI instruments
- Staff view, piano roll, ladders, tempo map, more
- Prints up to 16 staves per page
- Fast drag-and-drop editing
- Plays back digital audio wave files
- Includes Wave editor and CanvasMan™ software

Only \$169!

To order, or for more information, call

800-234-1171 or 617-926-2480.

Demo pack \$5. Song file collections and drum patterns also available



P.O. Box 760 Waterbury, MA 02272

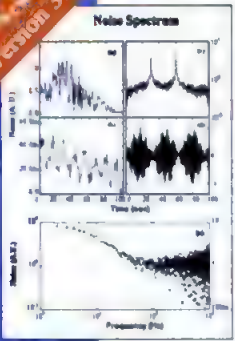
CIRCLE 782 ON READER SERVICE CARD

PREMIER

MULTI-MEDIA - MUSIC/MIDI



Version 3.5



**TECHNICAL GRAPHICS • DATA ANALYSIS •
DATA ACQUISITION • WINDOWS**

ORIGIN is your complete laboratory data management solution, providing unrivaled flexibility, publication-quality technical graphing, and sophisticated data analysis capabilities in an easy-to-use Windows environment.

**For a Free Demo, Call
1-800-969-7720**

MicroCal Software, Inc. One Roundhouse Plaza, Northampton, MA 01060
Tel 413 586 2013 • Fax 413 585 0126

CIRCLE 783 ON READER SERVICE CARD

INTERNET FREE

The world's premier internet system is now online, offering you access to computers around the world.



BUSINESS & RECREATION

FREE E-MAIL, USENET, IRC

1-515-945-7000



Free Catalog!
Call: 1-800-876-3475

Reasonable Solutions® affordable software for IBM PCs & compatibles.

- ▶ Best shareware available anywhere
- ▶ Hundreds of DOS & Windows programs for the entire family
- ▶ Always the latest versions
- ▶ Guaranteed Virus-Free
- ▶ Best technical support
- ▶ Lowest prices

Call or fax 24-hours a day, or write for your free Reasonable Solutions® software catalog today!

Reasonable Solutions®, Inc. 1221 Disk Drive, Medford, OR 97501-6639
Phone (503) 776-5777 / FAX (503) 773-7803 / Orders (800) 876-3475 / PCMag 11/94

CIRCLE 784 ON READER SERVICE CARD

"We convert more than 85% of inbound customer calls from PC Magazine Premier."

**Pierre A. Narath, President
Unicore Software, Inc.**

Write your own PC Magazine testimonial and put your ad here...Start advertising now!

Call 800-825-4237 today.

"PC Magazine Marketplace is the place where buyers look when they're ready to buy."



"Our own studies prove that PC Magazine pays for itself many times over. We're getting higher quality leads that turn into sales. It produces for us. For leads and revenue generated, PC Magazine Marketplace is number one."

**Mike Strand, President
StrandWare, Inc.
bar coding**

Write your own PC Magazine testimonial and put your ad here...Start advertising now!

Call 800-825-4237 today.

"PC Magazine Classified is a very wise investment."



"It's helping us build our customer base, do business with Fortune 500 and Fortune 1000 companies, sell in large volume and cut down on closing time by delivering very motivated buyers."

**Barbara Otte, Marketing Manager
Boffin Limited
multimedia**

Write your own PC Magazine testimonial and put your ad here...Start advertising now!

Call 800-825-4237 today.

As Seen on TV Channel 9 News as Low Price Leader

IBM • TOSHIBA • ZENITH D.S. • EPSON • COMPAQ • PACKARD BELL SHARP • AT&T • BONDWELL • AST • TEX. INST. • TWINHEAD & MORE

Largest Selection of Notebook Computers - 800-436-0552

Upgrade Your 286/386 to 486 - \$395

Notebooks/Laptops &
Desktop. We Upgrade & Ship
your Computer in 3 Days.
Call for Details!!!

Toshiba Notebook

\$499

40MB Hard
Drive
Call for
Details!!!

Toshiba Notebooks

T1850 Mono 80/120	\$995/1095
T1850 Color 80/120	\$1295/1395
T1900 Mono 120/200	\$1199/1299
T1910 Mono 120/200	\$1299/1399
T1910CS 120/200	\$1699/1799
T1950 Mono 120/200	\$1499/1599
T1950CS 120/200	\$1699/1799
T1950CT 200/320	\$2199/2399
T3400 Mono 120/260	\$1399/1699
T3400CT 120/260	\$2799/2999
T4400SX 80/120	\$999/1099
T4400 SX Color 120/200	\$1799/1899
T4500 Mono 80/120	\$1099/1199
T4500 Color 120/200	\$1999/2199
T4600 Mono 120/200	\$1799/1899
T4600 Color 200/320	\$3699/3899
T4700CS 200/320	\$2999/3199
T4700CT 200/320	\$4199/4399
T4800CT 510 MB	\$5899
T6400 SX Mono 120	\$2399
T6400 DX Color 200	\$2799
T6400 MM/DX2/50 200MB	\$3599
T6600 C/CD	\$5699
T6600 C/CDV	\$6599

Some Models are 'B' with 1 Year Warranty

IBM Notebook - \$699

**486 4MB
80MB**

\$699

- ◆ Weighs 2.5 lbs.
- ◆ FaxModem - **FREE**
- ◆ Extra Battery (\$150) - **FREE**
- ◆ DOS 6.0 - Windows - **FREE**
- ◆ Pen Pointing Device - **FREE**
- ◆ 6" Display ◆ Double Spaced HDD
- ◆ Leather Case ◆ Ext. Floppy Drive
- ◆ IBM Built SubNotebook - Dauphin Model

Lowest Price 486 in the Nation!!!

Color Notebook

80MB - \$899 Call for
Details!!!

\$449 Palmtop

- ◆ 2 - Type I PCMCIA slots
- ◆ 1MB RAM ◆ 1.5MB ROM
- ◆ DOS 5.0 ◆ MS Works
- ◆ Case ◆ 1.3 lbs.
- ◆ LCD ◆ Serial & Parallel Ports

Leather Carry Case

Features two individually
padded compartments
that measure 11" x
13" x 2". The computer
compartment has an extra
layer of shock absorbent
foam padding. The
second compartment is
designed to fit power
adapters, external drives,
keyboards, portable
printers or fax machines.

The case also features a
detachable shoulder strap, holds
disks pens, business cards, extra
batteries, modems and
accommodates a cellular phone.



Leather Portfolio \$19
In Denim \$29
In Leather \$39

IBM 486 - \$499

One Year IBM
On Site Warranty

- ◆ 4MB RAM
 - ◆ 3.5" 1.4MB Floppy
 - ◆ SVGA Card
 - ◆ DOS & Windows
 - ◆ Mouse
- with 80MB HDD **\$599**
8MB RAM/240MB HDD **\$799**



IBM 386SX - \$369

- ◆ 2MB RAM ◆ I/O Card ◆ VGA Card ◆
- ◆ Floppy ◆ DOS ◆ 40MB Hard Drive ◆

286 Desktop - \$199

- ◆ 1MB RAM ◆ Floppy ◆ Keyboard ◆
- with 40MB HDD - \$299

AST Multi Media 486-25

- ◆ 120MB HDD ◆ 4MB RAM
 - ◆ Double Speed CD ROM
 - ◆ 16 Bit Sound Card
 - ◆ Stereo Speakers
 - ◆ 3.5" 1.44 Floppy
 - ◆ SVGA Card
 - ◆ Mouse
 - ◆ 101 Keyboard
 - ◆ MS DOS ◆ Windows 3.1
- Monitors: VGA **\$99**
Color **\$199**

\$799

486 Notebook \$999

- ◆ 33Mhz ◆ 4MB RAM ◆ 120MB HDD
- ◆ Int. FaxModem ◆ Built in Trackball
- ◆ Math Coprocessor ◆ PCMCIA Slot
- ◆ Int. 3.5" 1.44MB Floppy ◆ 6 lbs.

Compaq Laptop

486 VGA - \$689

Grid Laptop

20MB Hard Drive
Call for Details!!!

\$349

386SX Laptop - \$599

- ◆ HDD ◆ 2400 Modem ◆ Call for Details!!!

ORDERS ONLY - 800-436-0552

Fax Orders/Inquiries: 714-975-1560
Customer Service: 714-975-0873

18017 T Skypark Circle, #1002
Irvine, CA 92714

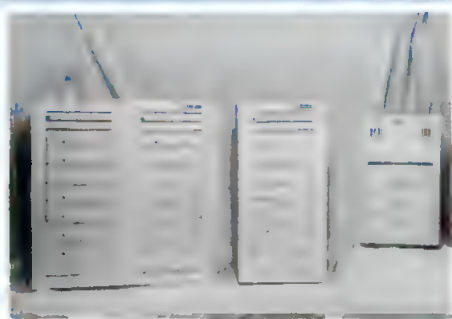
OPEN: 7 a.m. - 6 p.m. PST - Mon - Fri
9 a.m. - 3 p.m. - Sat

We Verify All Credit Cards



Policy: Prices and availability subject to change without notice. Above are cash prices only. Call for other forms of payment. We ship by U.S. First Class DHL. NO returns without RMA. 20% restocking charge on returned items. All sales final. Not responsible for computer bills. We check for stolen cards. Handling charge \$5.95. Not responsible for typing errors. All manufacturer warranties apply.

CD-ROM STORAGE SOLUTIONS



On-Line
Network Ready
CD-Rom Towers with
Corel Network
Manager Software



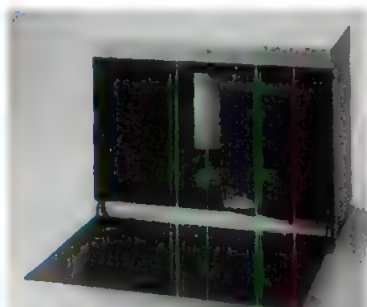
4 Bay **7 Bay** **14 Bay**
\$1,637 **\$2,746** **\$5,511**

SCSI Host Adapters:

Model	Bus	
AHA-1542CFK	ISA	\$299
AHA-1640K	MCA	\$381
AHA-2742TK	EISA	\$466

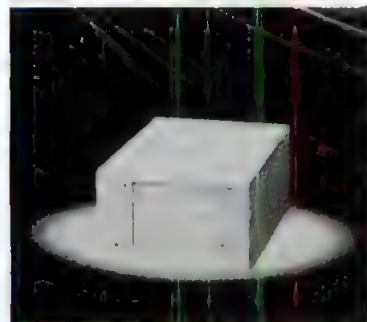
CD-Net for Dos 100 User \$1,295
(Optical Server Applications)

CD-Net for Netware 100 User \$1,295
250 User \$1,895



Near-On-Line Jukebox

Model	#Disk	#Drives	
Pioneer DRM-604X	6	1	\$1,295
Pioneer DRM-1804X	18	1	\$2,495
NSM CDR-100 XA	100	1	\$7995
Kubik CDR-240M	240	1	\$ CALL
Pioneer DRJ 5004X	500	4	\$18,750



CD-Rom Production Hardware

Pinnacle Micro RCD-202 Recorder	\$2,695
Yamaha CDR-100 Recorder	\$4,495
Fujitsu M3096G Scanner	\$4,995
Ricoh IS510 Scanner	\$12,450

Premastering Software

Incat Easy CD-PRO	\$1,995
Incat Easy CD-PRO MM	\$2,995

BOFFIN
LIMITED



612-894-0595
FAX: 612-894-6175

2500 W. COUNTY RD. 42 • SUITE #5 • BURNSVILLE, MN 55337

MEMORY factory outlet

TRUTH IN ADVERTISING? WOULDN'T YOU RATHER DEAL WITH A VENDOR THAT OFFERS YOU THEIR BEST PRICES RIGHT OFF THE BAT, THAN SOMEBODY THAT TRIES TO CHARGE YOU A LOT MORE FIRST IF THEY CAN GET AWAY WITH IT, BUT PROMISES TO BEAT ANY PRICE IF YOU'RE SMART ENOUGH TO DO YOUR SHOPPING? THINK ABOUT IT WELL, AND THEN YOU BE THE JUDGE.
Please check for current prices and brands/models not listed, but to let you compare, the following are samples of what our actual selling prices were on Aug. 24, 1994:

80387DX-33 MATH COPROCESSOR	\$49
CYRIX CX486DLC-25GP/33GP CPU	\$65
XIRCOM PCMCIA ETHERNET COMBO	\$233
MEGAHERTZ XJ1144 PCMCIA FAX	\$198
APPLE PBOOK 100 2/4/6MB	\$89/\$153/\$209
APPLE PBOOK 140/145/170 4MB	\$141
APPLE DUO 210/230/250/270 4MB	\$182
APPLE MAC PERFORMANCE 4/8MB	\$177/\$290
AST ADVANTAGE NOTEBOOK 4MB	\$177
AST ADVANTAGE 486/25 8MB	\$359
AST POWEREXEC EL/325SL 4MB	\$146
AST POWEREXEC 425SL S/E4MB	\$146
AST POWEREXEC 433SL 4MB	\$146
AST PREMIUM 486-33/33TE 4MB	\$187
AST PREMIUM EXEC 4MB	\$177
BROTHER HL-10H 8MB	\$358
COMPAQ CONCERTO 4/8MB	\$179/\$336
COMPAQ CONTURA/486 8MB	\$316
COMPAQ CONTURA AERO 8MB	\$332
COMPAQ DESKPRO 4MB/8MB	\$161/\$338
COMPAQ LTE ELITE 4/8MB	\$179/\$336
COMPAQ PRESARIO 4MB	\$161
COMPAQ PROSIGNIA 5/60 16MB	\$603
DECpc 325SL NOTEBOOK 4MB	\$146
DECpc MT/ATE 4MB/16MB	\$161/\$621
DECpc AXP 150 4MB/8MB	\$161/\$336
DELL DIMENSION 4MB/8MB	\$161/\$336
DELL OCTIPLEX 486 4MB	\$148
EPSON ACT LASER 1000/1500 2MB	\$108
EVEREX TEMPO/LX 2MB	\$116
GATEWAY 2000 P4D66/P560 16MB	\$587
GRID CONVERTIBLE/2260 6MB	\$293
HP DESKJET 500/510/520/560 256K	\$60
HP DESKJET 1200C/PS 4MB	\$148
HP LASERJET 4/4M/4SIMX 4MB	\$161
HP NETSERVER LC/LE/LFM 4MB	\$161
IBM AMBRA NC 425SL 4MB	\$178
IBM PS/1 CONSULTANT 16MB	\$587
IBM PS/VALUEPOINT 16MB	\$587
IBM THINKPAD 360/360C 8MB	\$347
IBM THINKPAD 755/750/720/700 4MB	\$203
NEC VERSA 4MB/8MB	\$192/\$353
OKIDATA OKILASER OL400E 4MB	\$229
PANASONIC CF-270/370 2MB	\$110
PANASONIC CF-380/480C 2MB	\$119
SHARP PC-6200/6220/6240 1MB	\$49
SHARP PC-6700/6781/6891 2MB	\$79
SHARP PC-7750/8650 4MB	\$196
SHARP PC-8041/8081 1MB	\$88
SRAM PCMCIA 512/1M/2M	\$96/\$126/\$221
SUN SPARCSERVER/5 8MB	\$353
SUN SPARCSERVER/20 16MB	\$685
TI TRAVELMATE TM2000 1MB	\$49
TI TRAVELMATE TM4000 4MB	\$194
TOSHIBA T1000SE/XE/LE 2MB	\$49
TOSHIBA T1800/T1950/T1850C 2MB	\$49
TOSHIBA T1200XE 2MB	\$79
TOSHIBA T1200XE 486SX-25 CPU	\$95
TOSHIBA T1800 2MB	\$79
TOSHIBA T1900/1910/1950/1960 4MB	\$188
TOSHIBA T2000/SX/T2200SX 2MB	\$49
TOSHIBA T3400/3600 4MB/8MB	\$178/\$348
TOSHIBA T4800/4700/4800/4500 8MB	\$337
TOSHIBA T5100 2MB	\$69
TOSHIBA T5200 486SX-25 UPGRADE	\$65
TANDY 1500-1500HD 1MB	\$61
TANDY 2820/3820/3830 2MB	\$120
TANDY 4800/4800HD 4MB	\$196
1MBx9-70 3-CHIP 1MB S IMM	\$37
4MBx9-70 9-CHIP 4MB S IMM	\$143
16MBx8-80 30-PIN 16MB S IMM	\$508
2MBx36-70 72-PIN 8MB S IMM	\$309
4MBx36-70 72-PIN 16MB S IMM	\$587

**CPU UPGRADES, FAX/MODEMS,
BATTERY PACKS, MATH CHIPS
CONTROL Memory Factory**
"always insist on CONTROL"

1155 Chess Drive, #116
Foster City, CA 94404
Phone: (415) 578-1901
Fax: (415) 578-1914
1-800-952-7867

IBM PARTS

MILLIONS OF PARTS IN STOCK

COMPLETE PC SYSTEMS	\$49-\$599
VGA MONITORS	\$39-\$189
SOFTWARE	\$1-\$99
PRINTERS	\$49-\$99
PROPRINTERS	\$129-\$299
COLOR INKJET PRINTERS	\$99
PS-2 MICROCHANNEL CARDS	\$9 and up
MODEMS	\$9-\$99
IBM BATTERIES	\$9-\$99
IBM SHEETFEEDERS	\$39-\$89
MONITOR REPAIR	\$60
Logic Boards, Printheads, etc.	CALL

PC PARTS
1800 PAXTON STREET
HARRISBURG, PA 17104

800-666-9373
FAX: 800-288-9373
90 DAY WARRANTY & IMMEDIATE SHIPMENT

CIRCLE 560 ON READER SERVICE CARD

YOUR FACTORY OUTLET!

NET Triple-Speed
CD-ROM Drives!

3Xp PORTABLE '299
250ms access
Only 2.4lbs!

3Xi INTERNAL '329
195ms access

3Xe EXTERNAL '349
195ms access

ALL UNITS
450kB sec transfer • 256kB cache
SCSI 2 • Multisession Photo CD
MPC Lev 2 • QuickTime • XA Ready
Context sensitive LCD status displays
Audio controls for music CD listening
NEC-FACTORY-RE-CERTIFIED

EASY SCSI!
15-bit 8-bit Adapter for
Controller Controller SCSI-parallel
\$49 FREE \$69
*with CD-ROM purchase

JEM 617-497-2500
COMPUTERS, INC.

CIRCLE 562 ON READER SERVICE CARD

BAR CODE READERS

AMERICAN MICROSYSTEMS
2190 Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

FOR PC, XT, AT, PS/2 & TERMINALS:

- ▶ No software changes required
- ▶ Data appears as keyboard input
- ▶ Reads Code 39, I-2of5, UPC/EAN, Codabar 11, 93, 128, MSI/Plessey
- ▶ Auto-discriminates between codes
- ▶ Accepts WAND, SLOT, MAG STRIPE, CCD, LASER
- ▶ Easy To Use

MAG STRIPE
SLOT (BADGE)
WAND
DECODER BOX

LASER
CCD
METRO LASER

BAR CODE PRINTING SOFTWARE:

- ▶ For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
- ▶ Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey

PORTABLE READERS:

- ▶ Use as a portable, wedge or terminal
- ▶ Input Devices: WAND, CCD, or 5V LASER
- ▶ Real-time clock for date and time stamps
- ▶ Automatic power off with resume
- ▶ "Built-in" inventory programs
- ▶ 54 key alpha/numeric keyboard
- ▶ Supports Hayes compatible modems

(800) 648-4452 • FAX: (817) 688-6232
30 Day Money Back Guarantee
One Year Warranty

CD ROM TOWER AND JUKEBOX SERVERS FOR ALL OPERATING SYSTEMS

- Configured with Plexor double or quadruple speed drives
- "Discport" CD Rom networking included (Slot in server not needed)
- Unlimited user license
- Map CD Rom drives as if they were on disk drives
- NLM's run on server but tower can be located anywhere on network
- Complete kit to network your CD Roms

JES HARDWARE SOLUTIONS

FOR BEST PRICE
CALL (800) 482-1886

CIRCLE 561 ON READER SERVICE CARD

BEST VALUE BARCODE
SUPERIOR QUALITY
MORE FUNCTIONS
LOWEST PRICE

(800)PC-CODES (722-6337)

Barcode Readers

- Keyboard wedge readers for PC, Mac
- Wand, Laser, CCD, slot, or Magstripe
- UPC code 39, 128, EAN JAN, 2of5
- Complete w/steel wand \$255
- Complete w/laser \$395
- Complete w/CCD \$345

Portable Readers

- Double duty as Non Portable
- Portable w/steel wand \$495
- Portable w/laser \$1,195

Barcode printing software from \$99
5 Year Warranty • Direct From Factory
30 Days Money Back • Dealers Welcome

Advanced Barcode Technology
48 SCHENCK AVE., GREAT NECK, NY 11027
(516) 829-2135 Fax (516) 829-0877

CIRCLE 563 ON READER SERVICE CARD

100 MHz

486 SX-33	849
486 DX-40	949
486 SLC 2-66	929
486 DX 2-66	1049
486 DX 4-100	1499
Pentium 90	2199

420 Mb HardDisk,
4 MB System RAM
32 Bit VLB True Color card
32 Bit IDE I/O Controller
1.2 or 1.44 Floppy Drive
Enhanced 101 Keyboard
2 serial, 1 Parallel, Game port

Network Cards • CD-ROMS • Hard Disks
Video Cards • Voice / Fax / Modem
Hard Disks • Tape Backup

Call For a complete Catalog & Price list
AMERICOMP MICRO DISTRIBUTION
800-795-6288
Phone: 301-881-5335 Fax: 301-816-3060
5550 Wilkins Ct, Rockville, Md 20852

CIRCLE 604 ON READER SERVICE CARD

ASSET2000 Asset Tracking System

- Reduce the expended to receive, issue and physical count asset items
- Reduce the cost and frustration of tracing misplaced lost or stolen assets

FREE Label & Barcode
\$1,195

HARDWARE:

- Scanners, Wands
- Decoders and Verifiers
- Portable and fixed data collection terminals
- Thermal transfer & direct printers
- PC's and related products
- Labels Tickets Tags Badges

Bar Code Printer

- Thermal Transfer
- Direct Thermal
- Label & Tag printing

from \$1,295

SOFTWARE:

- Label Generation
- Asset Management
- Inventory Control
- Access Control
- EDI
- Time & Attendance
- Labor Collection

Bar Code Readers

- PC, AT, XT, RS-232 PS/2
- MAC
- Laser, Wand, Slot
- Reader Mag Stripe

from \$179

Symbol I T-1700 Scanner

- Laser Scanner
- PC Wedge
- Cables

\$559

Acatech
20341 Lake Forest Dr., Suite 814
Lake Forest, CA 92630

Ph: (714) 830-6800
Fax: (714) 830-6882

CIRCLE 564 ON READER SERVICE CARD

"PC Magazine Classified is a very wise investment."

"It's helping us build our customer base, do business with Fortune 500 and Fortune 1000 companies, sell in large volume and cut down on closing time by delivering very motivated buyers."

Barbara Otto, Marketing Manager
Boffin Limited
multimedia

Write your own PC Magazine testimonial and put your ad here... Start advertising now!

Call 800-825-4237 today!

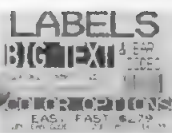
Bar Code Headquarters

Offices in
USA and
Europe

Labeling Software

For Dot Matrix or LaserJet

Windows
Version!



- Any Format, Any Size Label
- WYSIWYG or Text Design
- Easy, Powerful
- Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, AIAG, etc.
- Bar Codes: UCC-128, UPC/EAN, 2of5, MSI, 11, Codabar, Code 128, and Code 39
- Big Text and PCX Graphics tool!
- Powerful, Versatile, Easy to Use
- Imports ASCII data files from dBase, etc.
- LabelRIGHT™ for Windows — \$295
- Above Label Printed by LabelRIGHT™ — \$279

Bar Code Fonts for Windows

- Insert bar codes into any font based Windows program via "Hot Key"
- UPC/EAN, 128, 2of5, Codabar, Code 39
- Fonts, Bitmaps and Metafiles — \$199

Cordless Bar Code Reader



- For IBM or Macintosh
- Keyboard or Serial Attach
- No Software Needed
- Wireless range up to 100'
- Optional Pocket Beeper
- No License Needed
- USA & Canada Approved
- Optional Pocket Beeper — \$395
- Base Station, Cable, and Wand — \$695

Portable Bar Code Readers

for PC, XT, AT, PS/2, Macintosh,
and Serial Interface Computers

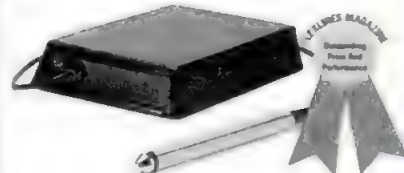
WITH
VOICE!

- Battery Operated Reader — 64K or 256K
- Kybd or Serial upload
- Display messages and optional Voice Messages tell Operator what to do. Messages are easily recorded (like answering machine) in any language.
- Wand, CCD or Laser Input
- UPC/EAN, 128, 2of5, MSI, Code 39, etc.
- Real Time Clock for date/time stamps
- Double duty as Non-portable Reader
- No Programming Necessary
- Portable label printer Support
- Very Easy to Program! Custom Prompts.
- 64K Unit with Wand & Voice — \$799
- 256K Unit with Wand and Voice — \$899



Bar Code Readers

for PC, XT, AT, PS/2, Mac
and RS-232 Terminals



- Attaches as 2nd Keyboard
- UPC/EAN, Code 128, 2of5, MSI, Code 39
- Wand, Magstripe, CCD, Slot Badge or Laser
- All European Keyboards Supported
- Superior Read Rates. Made in USA.
- Top Rated by Independent Reviews
- Complete with Laser Scanner — \$1250
- Complete with CCD Scanner — \$624
- Complete Wand only Reader — \$329

Ordering is Easy!

Call for
our Free
Catalog

- Made in the USA
- Free "800" Support
- Qualified P.O.'s Accepted
- 2 Year Warranty on Readers
- Same Day Shipping
- Free UPS Blue in US
- 30 Day Money Back Guarantee

European Office: (353) 1 6614 566
In US or Canada Call Toll Free

800-345-4220

Worthington Data Solutions
3004 Mission Street • Santa Cruz, CA 95060
Phone: 408-425-9538 • Fax: 408-438-9544

WORTHINGTON
DATA SOLUTIONS

Plug 'n Play Bar Code Solutions



ITS

and



**HEWLETT
PACKARD**

Hewlett Packard and ITS team up to offer plug 'n play bar code solutions. A complete line of bar code equipment, including the entire HP bar code reader line, is in stock and ready for immediate delivery.

30 Day Money Back Guarantee • Next Day Delivery
Call for Free Application Assistance

International Technologies and Systems
655 N. Berry Street, Suite K, Brea, CA 92621, (800) 228-9487
9201 Forrest Hill Avenue, Suite 108, Richmond, VA 23235, (800) 826-1688
International Sales Tel: (714) 990-1800 Fax: (714) 990-2503

CIRCLE 566 ON READER SERVICE CARD

PORTABLE PRODUCTS™

**YOUR COMPLETE SOURCE FOR
BAR CODE AND HANDHELD
DATA COLLECTION SYSTEMS**

- BARCODE READERS — Keyboard wedge, RS 232, PC, Mac, Most data terminal interfaces
- INPUT DEVICES — Laser, CCD, Wand, Slot, Magstripe — All available with built-in decoder
- PORTABLE HANDHELD READERS — DOS & Windows Application Generators — No programming experience needed. Develop your Application in minutes
- Printers, Verifiers, Label Software, Labels, Custom Cases, Custom Software Development, System Integration. Complete Systems

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG
1-800-849-0958

**PORTABLE™
PRODUCTS**

A Division Of International Systems Group, Inc.
8401 A. Mayland Drive • Richmond, VA 23294
Phone: 804-146-0111 • Fax: 804-146-0196

CIRCLE 567 ON READER SERVICE CARD

CLASSIFIED

THE BARCODE LEADER DOES IT AGAIN...

KEYBOARD WEDGE SOLUTIONS!

HAND-HELD LASER GUN

FREE
BARCODE
PRINTING/CREATION
SOFTWARE
WITH LASER PURCHASE

\$895

STAINLESS STEEL WAND \$279

800 TECHNICAL SUPPORT
30 DAY MONEY BACK GUARANTEE
SAME DAY SHIPPING
2 YR LASER SCANNER WARRANTY

1-800-486-0620
EAST COAST
1-800-486-9585
WEST COAST

DATAVISION
30 INDIAN DR., IVYLAND, PA 18974
10421 BURHAM DR., GIG HARBOR, WA 98325



CIRCLE 568 ON READER SERVICE CARD

WORLD'S LEADING Barcode Re-marketer

**Hand-Held
Laser & Wedge
\$489**

**Wand &
Wedge
\$199**

800 Technical Support
30 Day \$ Back Guarantee
Same Day Shipping
2 Year Warranty

RYZEX
RE-MARKETING
800-264-6764

Call for even Better Deals on Used/Surplus Equipment



CIRCLE 571 ON READER SERVICE CARD

BAR CODE LABELING, PRINTING & READERS

**PRINTBAR™
BAR CODE
PRINTING**

New Version!
**BEAR ROCK
BAR CODE LABELER™
for Windows**

- Design labels with bar codes, text & graphics.
- Choose from over 450 popular label formats, or design your own.
- Print all popular bar code symbologies.

**Money Back Guarantee
Bundle Discounts
800 232-7625**

**CODESCAN 3000™
BAR CODE READER**

- Compatible with PC, PS/2, Macintosh or serial terminals.
- Comes with wand and 5 year decoder warranty.
- Laser gun, CCD, badge slot, magstripe options.

4140 Mother Lode Dr., Ste. 100,
Shingle Springs, CA 95682
916 672-0244 • Fax 916 672-1103

Bear Rock TECHNOLOGIES



MaxiLAN: LAN-Ready Data Collection PC

NEW!
SPREAD SPECTRUM
MODEM AVAILABLE.

MaxiLAN packs the power of a 386SX PC with on-board Ethernet and two PCMCIA slots in a compact 9.5 x 6 inch package.

- Two bar code ports, two serial and one parallel port, plus external keyboard.
- 4 x 40 backlit LCD display.
- Can be mounted on counter top or wall.
- Features local solid state hard drive.
- DOS 6.0 and Novell drivers pre-loaded: type NET and you're connected to a NetWare server.
- Drivers for TCP/IP, LANtastic and LAN Manager included.
- Unlimited telephone technical support.

"MaxiLAN installation is a cinch. We got the product up and running in under a minute."
August 93

UBI

To receive more information please contact UBI at:
(301) 210-3000 or fax: (301) 210-5498



CIRCLE 572 ON READER SERVICE CARD

BARCODE MAGNETIC STRIPE SYSTEMS

12140 Seven Way, Placentia, CA 92653

\$249

Hewlett Packard
Stainless Steel Wand with
decoder. **FREE WAND HOLDER.**

PORTABLES with data collection or RF capability. 64K-4.2Mb.

P.O.S. software, cash drawers, receipt printers, pole displays, programmable keyboards.

INVENTORY, TOOL, PICK, ASSETS, RECV, TIME and ATTEND... application software

RF Terminals

MAGNETIC STRIPE READ/WRITE SYSTEMS for tracks 1,2 and 3 - \$1099

SOFTWARE WEDGE (DOS/WIN) with HP steel wand or laser

PRINT SOFTWARE (DOS/WIN/UNIX...)

FREE Bar Code Printing Software with any purchase. \$149 Retail

\$849

SYMBOL LS2000
Laser Scanner with decoder. **FREE LASER STAND.**

800/653-4252 USA
800/219-5178 CANADA
908/270-0016 INTL
908/270-0820 FAX

30-Day Money Back Guarantee*
1-5 Yr. Warranty • MADE IN THE USA • Same Day Shipping
FREE UPS Ground

IBS

CIRCLE 570 ON READER SERVICE CARD

BAR CODE EXPERT

HP steel wand with Keyboard wedge reader **\$219**

3" CCD with built-in Keyboard wedge reader **\$329**

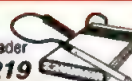
Portable data collector **\$599**

- 128K RAM (expand to 256K)
- Built-in program generator
- Uploads data directly to your application software
- Can be used as a fixed reader

- Keyboard wedge reader for PC/XT/AT, PS/2
- MAC Terminals: No software change
- Reader with RS-232, RS-485, DTMF output and multidrop protocol.
- Direct from manufacturer. 30 day money back guarantee. Please call for free catalog.
- Dealer and distributor's discount available

800-765-2271

IBS-Intelligent Barcode Systems
16031 Kaplan Ave., City of Industry, CA 91744
Tel: (818)968-8265 • Fax: (818)968-5527





5-Year Bar Code Printer Warranty!

Including Parts, Labor, and *Printheads**

Label Printing Kits
WYSIWYG Label Software
Free Loader Printers
800 Tech Support
In-Stock Labels & Ribbons

One Stop Bar Code Solutions

- Wedge Readers**
Keyboard and Terminal Wedges for PC, XT, AT, PS/2, Mac, RS232/Terminals. Advanced data formatting. Decodes all major bar codes, supports multiple scanning devices. New!!! Software Decoder for Laptops/Notebooks
- Portable Readers**
DOS compatible, 2-16 line display, 64K-2 Meg memory, multiple keypad options. Resident or DOS/Windows programming. Optional integrated portable/laser
- Scanners**
Wand, CCD, laser, slot scanners, and magnetic stripe readers
New!!! Memory Button Technology

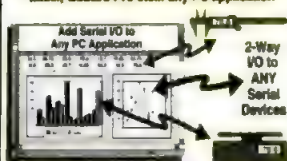
Satisfaction Guaranteed!
1-800-805-0084
DATAGRAPHICS, INC.

PH (804) 763-2897 FAX (804) 763-4717

CIRCLE 573 ON READER SERVICE CARD

RS232 Direct Into Any PC Program

Read Real-Time Serial Data Into Lotus
Excel, Quattro Pro etc... any PC application



- ✓ SoftwareWedge adds serial I/O to any PC app.
- ✓ RS232 data appears in any program as if typed in!
- ✓ Eliminates manual data entry or custom programming.
- ✓ Advanced features allow full customization of all input.
- ✓ Fully supports DDE in Windows, OS/2 or NT.
- ✓ Now with Free RS232 Debug/Diagnostic software.

No Special Hardware or Programming Required!

NEW! SoftwareWedge™

Does ver. Only \$159, Windows \$199

NEW! Pro Vers. Now Avail.

Call For Free Info

TAL 800 722 6004

T.A.L. Enterprises, 2022 Wallace St., Philadelphia

PA 19130. (215) 763-2620 Fax: (215) 763-9711

AutoData PRO™ II

Desktop Forms Processing Software
for Windows 3.1

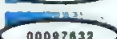
AutoData PRO II automates and simplifies the data collection process. Forms are read and the data is exported to your file format. A variety of desktop scanners are available.



HAND-PRINTED - reads name, address, date, phone numbers, etc.



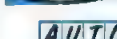
BAR CODE - reads product numbers, territory codes, form IDs, etc.



OCR - reads preprinted job codes, order numbers, form IDs, etc.



CHECK MARK - reads multiple choice, rating, true/false, etc.



A Windows 3.1 DLL is Available for Developers



AutoData Systems

10365 W. 70th Street • Eden Prairie, MN 55344

Phone: 612/941-8180 • FAX: 612/941-7312

Toll Free: 800/662-2192

CIRCLE 576 ON READER SERVICE CARD

The Mail Order Wizard

Everything you need to manage your growing phone-order or mail-order business.

- Order processing
- Mail list management
- Electronic charge processing
- Inventory control
- UPS manifest
- Financial reporting
- Ad forecasting

Winner of Home Office Computing's General Excellence Award

Systems start at \$695

Call for free info or \$20 demo.

The Haven Corporation

1227 Dodge Ave., Suite M93

Evanston, IL 60202-1008

800-676-0098 or 708-869-3553

CIRCLE 575 ON READER SERVICE CARD

Trans-Ameritech

Life is too short to compute on anything else!

Presents:
UNIX on CD-ROM

- Stockware Distribution
- BSD Distribution
- X Windows
- Applications
- All Sources are included!
- Install directly from CD-ROM
- TCP/IP, NFS, Development Environments

Price: \$39.95

Russian Games

- NEW! First time on US market!
- Great collection of Russian games, developed by Nikita Ltd.
- 16 Games on one CD-ROM!
- VGA Resolution
- Sound Blaster Compatible
- For all ages: 7 - 99!!!

Price: \$39.95

Tel. (408) 727-3883

FAX (408) 727-3882

CIRCLE 582 ON READER SERVICE CARD

Windows™ version
PROFESSIONAL BAR CODER™
210.496.5109

ProPaks™ SOFTWARE/FONT PACKAGE

Create Bar Codes Like a Pro.

Code 3 of 9 version \$99

◆ automatically encodes.

◆ calculates checksums.

◆ paste to most any program: Word™, WordPerfect™.

◆ Choose: Expanded, Variety, or Condensed font package.

ProCodes™-\$49

1 font and software package

RIVER CITY GRAFIX

Signatures \$39

Logos-Quote

CIRCLE 574 ON READER SERVICE CARD

RFFLOW

Professional Flowcharting

For Microsoft® Windows

DATA FLOW

SYSTEM DESIGN

PHYSICAL FLOW

ORGANIZATION CHART

STRUCTURE CHART

Create professional, fine quality charts quickly and easily. Call for free trial disk:

(303) 683-5767 FAX (303) 689-4889

RFF ELECTRONICS

112900

1153 Banner Court, Loveland, CO 80538

CIRCLE 577 ON READER SERVICE CARD

Voice Mail Cash Machine

Make thousands of dollars effortlessly by installing our voicemail in your 286/386. Use it to answer your home office phone, rent pocket-pagers, advertise products or operate a pay-per-call service using credit cards, passwords or a 900#. Systems start at \$295.

Call 24 hours: 800.283.4759

Int'l & Demo line: 818.718.9560

DemoSource™

The Voice Application Superstore

8345 Reseda Blvd, Ste 202

Northridge, CA 91324 USA

CIRCLE 579 ON READER SERVICE CARD

CD-ROMs

70 Million Households Phone Book (DOS) \$39

7th Guest (2 Discs) M/M \$28

Adventures In Heaven 2 (GAMES) DOS/WIN \$19

American Heritage Dictionary \$25

Blue Force (DOS) \$25

Business Heaven (DOS/WIN) \$19

Business Library (WIN) \$25

Clipart Heaven 2 with 500 page Book \$39

Compton's Interactive Encyc. 1994 (MPC) \$39

Cookbook Heaven 2 (DOS/WIN) \$18

Dr. Book of Home Remedies (MPC) \$22

Encarta 1994 (MPC) \$69

Family Doctor 3rd Edition (MPC) \$18

Font Heaven (2200 TTF & ATM Fonts) \$19

freePHONE (DOS/WIN) \$29

Groliers M/M Encyclopedia (MPC) \$39

Hacker Chronicles Vol. 2 (DOS) \$29

Honor Roll Guide to Mathematics (WIN) \$19

Internet Access \$29

Jazz: A Multimedia History (DOS/WIN) \$29

Kids Zoo & Undersea Adventure (DOS) \$29

Kings Quest VI (MPC/DOS) \$20

Lawnmower Man (DOS) \$22

Learning Heaven (DOS) \$15

Learn To Do Desktop Publishing (WIN) \$25

Mad Dog McCree II M/M (DOS) \$39

Megaware (DOS) \$22

Microcosm (DOS) \$22

Microsoft Bookshelf 94 (MPC) \$49

Microsoft Golf (MPC) \$29

Midi Music Shop Professional (WIN) \$19

Monarch Notes (DOS) \$35

Monster Media 94 \$29

Multimedia Platinum (WIN) \$15

Night Owl V13 \$29

PC Library (WIN) \$19

PharmAssist Guide to Health & Medicine \$35

Phoenix 5 \$15

Pier #5 \$25

Puff Puff - Joins The Parade (DOS) \$20

Return To Zork (DOS) \$22

Shareware Heaven 3 \$29

Shareware Studio V \$19

Silent Service II (DOS) \$29

So Much Modern Madness \$25

Sports Illustrated 94 (WIN) \$17

Total Baseball 1994 (MPC) \$19

Virtual 3-D (DOS) \$19

World Circuit Simulation (DOS) \$22

For A FREE Catalog Call

800-672-3472

To Order Call

800-755-4619

Most Significant Bits

15508 Madison Ave

Lakewood, OH 44107

FAX 216-221-4411 • Info 216-529-1888

CIRCLE 581 ON READER SERVICE CARD

RETAIL STORE POINT OF SALE

Need Inventory Control??

For all retail stores. Has quick invoicing, on line stock search and browse, sales analysis, stock order listings, and inventory updating

\$289 - \$489

Cash drawers, tape receipt

printers, barcode scanners

Accts Receivables, Mailing

List program, Barcode

programs, General Ledger,

Accounts Payables

Inventory Programs for labs,

supply rooms, dental offices,

Hospitals, Auto Parts, Tire

Dealers, and wholesalers

Free technical support

800-426-6598

Freeman Software

334 Fieldside - Garland, TX 75043

CIRCLE 578 ON READER SERVICE CARD

ClickBook

Turns Any

Windows File

Into A Booklet

Now Available at

CompUSA, Egghead,

PC Connection, Micro

Warehouse, PC Zone,

Inmac and Misco.

Bookmaker Corp.

Tel: (415) 354-8161

Fax: (415) 856-4734

Orders (800) 766-8531

CIRCLE 578 ON READER SERVICE CARD

CD-ROMs

800-409-0617

100'S OF TITLES IN STOCK

MANY FOR \$10 AND LESS!

• Games

• Space

• Hobbies

• Health

• Reference

• Business

• Technical

• Pictures & Animation

• Children

• Maps

• Entertainment

• Nature

• Education

• Sounds

• DTP

JD EXPRESS Inc.

For Your CD-Roms

315 KICKBUCKET AVE. - SCHENECTADY, NY 12304

CALL OR FAX FOR OUR LISTINGS

ORDERS 800-409-0617

PHONE 516-563-0617

FAX 516-563-0618

We Accept M/C Visa Discover Card

Voicemail

SOFTWARE KIT

- Fax On Demand
- Call Processing
- 900# Compatible
- Remote Data Entry
- Supports 64 Lines

LaserVoice 2000 comes ready to install in your PC. It's easy and simple to install.

Feature rich and state of the art technology makes LaserVoice 2000 the obvious choice.

From \$1495.

**HEAR THE DIFFERENCE!
CALL TODAY!**

216-253-8787

Free technical support ☎

AMERIFAX 572 W. Market St., #5
Akron, OH 44303

CIRCLE 580 ON READER SERVICE CARD

Use your PC to Master Japanese and Chinese

Enjoy mastery of Asian languages with Smart Characters for Students™ word processing, reading, writing, translating, and learning tool for PCs. Handy on-line references, dictionaries, furigana and English gloss annotations speed reading, writing, and translation. Learn and use kanji and hanzi rapidly and effectively while creating your own letters, faxes, and vocabulary lessons. Version 2.9 is both DOS and Windows compatible. Just \$99.95 in stores or directly from us. Call or write for a free brochure.

Apropos Customer Service 800-676-4021
8 Belknap Street, Arlington, Massachusetts 02174.

知 字

PCRESC-U™

Improved back-up system that comes to the rescue of your crashed disk.

- 30 Day Money Back Guaranteed!
- Accepting All Major Credit Cards



EliaShim
microcomputers, inc.

Phone: 1-800-477-5177

4005 Wedgemere Drive, Tampa FL 33610

Phone: (813) 744-5177

Fax: (813) 744-5197

CIRCLE 588 ON READER SERVICE CARD

Home Study

ACCREDITED B.S. DEGREE in Computer Science

Easy-to-study lessons written by the Grantham staff, and supplied to students along with software and instructional assistance—personal help by mail, phone, fax, BBS, whatever is appropriate in each case.

Professional software, no additional charge. Our emphasis is on teaching you computer science and guiding you to professional competence as well as your B.S. degree. Our degrees are accredited by the Distance Education and Training Council, Washington, DC.

Free Catalog: 1 (800) 955-2527

**GRANTHAM
College of Engineering**

Grantham College Rd., Slidell, LA 70469-5700

UniType™

Localization Kit for Windows

Type foreign languages in your favorite Windows applications as easily as you type English!

From \$99.95. Here's our guarantee: If you are not comfortably using your language of choice within 30 days, return the product for a full refund.

European, Cyrillic, Asian, Middle Eastern, Indian, Biblical & more – scalable fonts for all the world's languages. Call the Win Language™ experts!

Ask about our Expert Translation Service and Product!

Gamma Productions, Inc.
12625 High Bluff Drive #218, San Diego, CA 92130
Sales: 800-97-GAMMA Tel: 619-794-6399 Fax: 619-794-7294

CIRCLE 586 ON READER SERVICE CARD

Key-Lok™ Security

- ☐ Fighting piracy since 1982.
- ☐ Algorithmic response
- ☐ Programmable memory
- ☐ Very economical
- ☐ Device transparent to PARALLEL/SERIAL port
- ☐ Multiple security layers
- ☐ Counters/Real-time clock
- ☐ Multiproduct licensing
- ☐ DOS/UNIX/VMS/etc

Access Control System

Diskette Drive Locks

Microcomputer Applications

3167 E. Otero Circle

Littleton, CO 80122

(303) 770-1917

CIRCLE 584 ON READER SERVICE CARD

B.S. & M.S. In Computer Science

- ALL COURSES HOME STUDY
- Approved for tuition reimbursement by leading corporations
- Increase your earning power
- Join students from leading computer companies
- Ada and C++ courses available

FOR FREE
INFORMATION
CALL 1-800-
767-AICS or
1-205-323-6191

AMERICAN
INSTITUTE
COMPUTER
SCIENCES

The leading edge of learning

IMAGERS®

OVERNIGHT
\$4.95
Slides & Canons
POSTSCRIPT

Digital Output & Production Center

- Slides/Overheads
- Dye-Sub Output
- Large Color Posters
- Canon Fiery Lasers
- Slide Duplication
- 4x5 Neg/Pos/B&W

Photo CD
Scan 3.90
(800) 232-5411
22-7th St., Atlanta, GA 30306 • 404-877-0003

CIRCLE 583 ON READER SERVICE CARD

“PC Magazine Marketplace is the place where buyers look when they're ready to buy.”



“Our own studies prove that PC Magazine pays for itself many times over. We're getting higher quality leads that turn into sales. It produces for us. For leads and revenue generated, PC Magazine Marketplace is number one.”

Mike Strand, President
StrandWare, Inc.
bar coding

Write your own PC Magazine testimonial and put your ad here...Start advertising now!

Call 800-825-4237 today!

A chain is as strong as its weakest link.

New!
CD-Crypt
for secure
CD-ROM
distribution

Support for
Windows NT

The only product that combines
fortified software encryption with
the Hardlock™ family of copy
protection devices for simple user
and network implementation.
Made in the U.S.A.



Picture your Hardlock™ key as a bike lock, and the accompanying software routines used to implement the copy protection as the chain. You can own the best lock that money can buy, but that lock is useless if the chain is weak.

Introducing **HL-Crypt**, a major breakthrough in copy protection. HL-Crypt is not just a shell or simple conditional response checker. Using our proprietary Patcher Technology, HL-Crypt encrypts and binds the application to your Hardlock™ device. HL-Crypt features many protection modules that secure the application against piracy, reverse engineering, and debugging, to name a few.

Picture HL-Crypt as an ironclad chain. The only ironclad chain in the industry today.

For more information, call
1-800-562-2543

HL-Crypt

The Fortified Protection Linker
for Hardlock

GLENCO
ENGINEERING INC.

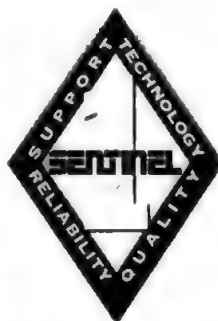
SERVING THE SOFTWARE INDUSTRY SINCE 1979

270 Lexington Drive
Buffalo Grove, IL 60089-6930
Phone 708/808-0300
Fax 708/808-0313

Contact us for the name of the distributor in your country

CIRCLE 586 ON READER SERVICE CARD

Software Protection from the Leader



Sentinel

The Worldwide Standard

More developers rely on Sentinel®, from Rainbow, than any other software protection in the world.

Only Sentinel gives you advanced protection for any platform. And every Sentinel meets the industry's most stringent quality standards.

Rainbow supports you with the industry's largest technical support staff. And once installed, Sentinel is truly transparent to your end-users.

So, when your software deserves the best protection, protect it with Sentinel. Protect it with confidence.

Only Sentinel Delivers:

- The Most Advanced Protection
- Protection For Any Platform
- Highest Quality & Reliability
- True Transparency For End Users
- Support From The Industry Leader

Order Your Sentinel
Developer's Kit Today!

Used By Over
11,000 Developers

Quick &
Easy To
Implement

5 Million In
Use Worldwide

SENTINEL
Securing the future of software

Call 800/843-0413

Tel 704/523-9500 • Fax 704/523-7651

RAINBOW

Offices & distributors located worldwide.

©1994 Rainbow Technologies, Inc. Sentinel is a trademark of Rainbow Tech.

CIRCLE 585 ON READER SERVICE CARD



SAFEGUARD YOUR PROGRAMMING INVESTMENT PROTECT YOUR SOFTWARE TODAY

A great deal of time and effort has gone into building your new product and you have decided to protect against Software Piracy and Illegal Distribution.

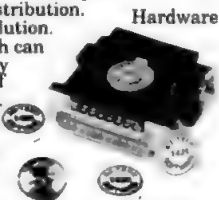
Now you must choose between a **Software** or **Hardware** solution.

As your partner in the fight against Software Piracy, Az-Tech can help you make the right choice. We are the only company that offers you Compatibility, Ease of Use and Degree of Protection in both a Software and a Hardware Solution.

Az-Tech's security experts will help you to understand
**DATE & EXECUTION LIMITS - COMPRESSION -
ENCRYPTION - SERIALIZATION - REMOTE RESET**
and much more. Don't reinvent the wheel!



Software



Hardware

EVERLOCK

Call Today For
A Free
Demo

(800) 227-0644

EVERKEY

Ask us about our NEW Trial
Packages and start protecting
your Programming Investment
TODAY !!!

Az-Tech Software, Inc.

LEADERS IN SOFTWARE SECURITY
201 East Franklin, Suite 11
Richmond, MO 64085

(816) 776-2700 FAX (816) 776-8398

CIRCLE 587 ON READER SERVICE CARD

SOFTLOKII

The **KEY**
to protecting
your software
investment!

Latest ASIC Technology
Easy to use
Lower unit cost
Password protected Note Pad
DOS/Windows/Networks

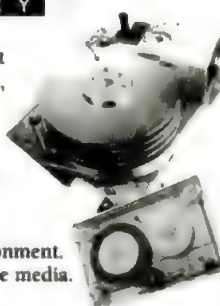


CIRCLE 565 ON READER SERVICE CARD

Ontrack

DATA RECOVERY

See us at
Comdex Fall '94!
Sands 4645



- Ontrack Data Recovery can recover data lost due to: Data corruption, mechanical failure, electrical surge, virus infection, water and fire damage.
- 24-Hour worldwide support with weekend, priority, and on-site service available
- Expertise in virtually every operating environment. Service is also available on tape & removable media.
- Drive & tape warranty preserved by major manufacturers! Call for more information.

MN: 1-800-872-2599 • CA: 1-800-752-7557

UK: +44 81 974 5522 • Germany: 0130 815 198 • France: 05 90 72 42
6321 Bury Drive, Eden Prairie, MN 55346 • 2400 Main Street, Suite 200, Irvine, CA 92714

CIRCLE 589 ON READER SERVICE CARD

Quit typing & talk!



TELECONFERENCING
begins
JANUARY 1995

THE FIRST SERVICE EXCLUSIVELY
FOR BBS AND INTERNET USERS

- Spontaneous conferences for 2-100.
- It's a great way to extend your online time with live voice communication under your screen name.
- Complete privacy maintenance for internet games-players, bulletin board users, and chatters.
- It's simple. Once you've established your account, call our toll free number with any 6 digit passcode you and your partner have agreed to online. Voila-you'll be bridged together.
- "On the fly" account set up-Go immediately to conference from account set up.
- \$100 per month membership fee & only .30/minute.

•FREE TRIAL•

USE READER SERVICE CARD FOR BROCHURE
or CALL 1-800-999-5001

CIRCLE 594 ON READER SERVICE CARD

CONVERSIONS

To OR From Virtually
Any Tape OR
Disk Format

Including:

- 9-track • DAT
- 3480 • QIC
- 8mm • Diskette

Conversion Systems Sold
Lowest Prices on Tape/Cartridge

Call 8 a.m. to 5:30 p.m. Eastern Time

HORAN DATA SERVICES
1-800-365-4408

708 Walnut Street, Suite 700
Cincinnati, Ohio 45202-2072

CIRCLE 590 ON READER SERVICE CARD

The Fastest
Turnaround! ★ ★ ★ High Quality
Media!

DISKETTE DUPLICATION

Count on our Reliable, Worry-Free Service!

SOFTWARE PACKAGING SUPPLIES & FULFILLMENT

Printed Sleeves, Labels, Vinyl Pages,
Mailers, Licence Agreements,
Shrink Wrapping, Mailing etc.

CD-ROM MASTERING & DUPLICATION

One-off CD, Small and Large
Volume duplication and Packaging

MEDIA CONVERSIONS

2500 Word Processing Formats,
Disks, 9-Tracks, 3480, Colorado, QIC-80,
8mm, 4mm DAT, TK50, OCR Scanning

BLANK DISKS/CD-ROM'S

Will beat any advertised price!
COMPANY COMPENDIA Inc.

1-800-374-DISK

Ph. 312-419-8771 Fax: 312-419-1390

CIRCLE 592 ON READER SERVICE CARD

"We tried all
the utilities
and nothing
worked. Total Recall
recovered 100% of our data and
returned it the same day. These
guys are amazing!"

— R.H. Dabow, PC

- Class 80 Clean Room
- Best Rates
- Fastest Turnaround
- Best Success Rate
- Recommended by Major
Manufacturers

**Absolute
Data
Recovery!**

**TOTAL
RECALL™**
800.743.0594

24hr. help lines • 24hr. service
24hr. 1-800-743-0594

CIRCLE 593 ON READER SERVICE CARD

DUPLICATION EQUIPMENT

For-in-house
duplication,
MediaFORM
is the source.
We sell and
service high-
quality software
duplication and
labeling equipment. And we can
tailor a complete, cost-effective
system to meet your specific needs.



Copies both 3.5 & 5.25
Diskettes. Like Two Machines
for the Price of One.

MediaFORM

800-220-1215

215-458-9200 (in PA) Fax: 215-458-9351
Exton, Pennsylvania 19341

CIRCLE 596 ON READER SERVICE CARD

DATA CONVERSION

DISKS • TAPES • CARTRIDGES
CONVERSION-DUPLICATION-SCANNING

MORE FORMATS THAN ANYONE!

Quick • Reliable • Quality

WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS

IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word

Lotus
Dbase
MICOM
LANIER

CPT, NBI
DISPLAYWRITER

8/4MM, XEROX, CP/M, UNIX ...

NATIONAL DATA CONVERSION

57 East 10th Street, New York, NY 10003

(212) 463-7511

AMERICA'S LEADERS IN DATA CONVERSION

CIRCLE 591 ON READER SERVICE CARD

Data Crash! We're Going In!



CPR & RS Data Recovery Service

DOS, OS/2, Mac, Sun,
Novell, Unix, Mac Experts!
Syquest, Bernoulli, Tape
Optical Service

CPR 3.0

Data Recovery Software

Computer Peripheral Repair &
Recovery Services Inc.

11440 Okeechobee Rd. Suite 200
Royal Palm Beach, FL 33411

800-765-9292

CIRCLE 625 ON READER SERVICE CARD

DATA CONVERSION

If you want
the most
complete
conversion
services in the industry,
just call...



(800) CONVERT

Capabilities include over 5000 formats

PIVAR

COMPUTING SERVICES, Inc.®

165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089

(708) 459-6010

DUPLICATION FROM \$.49

HIGHEST QUALITY MEDIA

From \$.49 (.525") and \$.80 (.350")

- All Diskette Formats
- Custom Labels
- Diskette Mailers / Accessories
- Assembly Services
- Generous Volume Discounts

FORMATTED DISKETTES

QTY	SONY VERBATIM	OEM GENERIC
250		
3.5" DD	\$.47	\$.45
3.5" HD	\$.57	\$.53

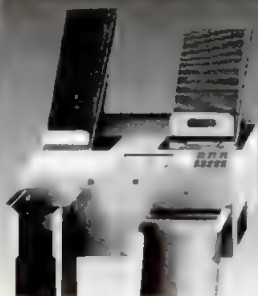
- 10% Discount on First Order
- DOS, Macintosh, or Custom Formats
- Colored Media add \$.05
- Private Labeling/ Volume Discounts

800-255-3142

Diversified Systems Group, Inc.
PO Box 1114, Issaquah WA 98027

CIRCLE 596 ON READER SERVICE CARD

DUPLICATION EQUIPMENT



- StandAlone & PC based units available
- Compact design
- Low maintenance
- Economically priced
- Expandable options to network system
- Fast - Up to 138 3- 1/2" 1.44MB per hour
- One year factory warranty

BULK DISKETTES DATA CARTRIDGES MEDIA SUPPLIES

CALL: CHAMPION DUPLICATORS INC.
800-752-2145 FAX 510-659-0247

CIRCLE 597 ON READER SERVICE CARD

CALL THE "MEGA-SOURCE"!! SOFTWARE PRODUCTION

Call Us First...

MegaSoft is a leader in the Duplication Industry. We provide the best Service, Prices and Solution for all your duplication needs. From simple runs to intricate configurations with drop-dead deadlines, MegaSoft is your one-stop "mega-source".

- ✓ Disks & Tapes
- ✓ Design & Printing Services
- ✓ Package Assembly
- ✓ Fulfillment
- ✓ In-Bound Tele-Sales
- ✓ PUBLISHING SERVICES

NEW!

CD ROM



PRODUCTION

Sales & Service

Call Us First... MegaSoft can customize a complete cost effective system to meet your specific needs.

Autoloaders • Standalones • Labelers • Sleevers

LOW MAINTENANCE
BEST PRICES
EXPANDABLE OPTIONS
We Service ALL Brands!

YOUR DUPLICATION HEADQUARTERS

MEGAsoft

1-800-222-0490

819 HWY. 33 EAST
FREEHOLD, NJ
07728-4431
FAX (908) 462-8458

4660 PINE TIMBERS
SUITE 165
HOUSTON, TEXAS
77041-9322

CIRCLE 600 ON READER SERVICE CARD

MEDIA VALUE

OUR NAME SAYS IT ALL!

Diskettes & Tapes

PC Formatted	OEM Grade
3.5" DS/DD 34¢	3.5" DS/DD 39¢
3.5" DS/HD 44¢	3.5" DS/HD 49¢
5.25" DS/DD 20¢	5.25" DS/DD 21¢
5.25" DS/HD 26¢	5.25" DS/HD 27¢

Recycled OEM Grade

3.5" DS/DD 30¢	5.25" DS/DD 15¢
3.5" DS/HD 40¢	5.25" DS/HD 23¢

5.25" disks include sleeves
All disks priced in lots of 100.
Lower prices for larger quantities.

Data Cartridges

2120 QIC 80 Bulk	\$13.99
2120 QIC 80 Verbatim	\$17.25

(In lots of 5)

Monthly Special

CD Caddies \$4.99 each

800-845-3472

FAX (408) 727-3155

Diskette and CD Duplication available.

CIRCLE 598 ON READER SERVICE CARD

Automatic Disk Duplicator

Standalone \$1,995

Industrial quality duplicators
at half the price. Copies up
to 150 3.5" PC & Mac
diskettes per hr.

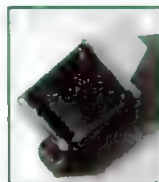
1-800-887-9906

or (510) 689-1695

CIRCLE 599 ON READER SERVICE CARD

JetMaster

Save \$\$\$
in Printing
Costs



InkJet Refill System

The most efficient, RE-USABLE jet printer
recharge kit available. **Lowest cost per
recharge in the world.** Buy one kit, then
just buy ink as needed. Available in 2 oz.,
pint, or gallon size. Ink costs as low as
\$1.00 per recharge. Waterproof inks avail-
able. Most jet printers supported.

BJ3 (Stylewriter, Canon BubbleJet) \$29.95 JM6 MCI HP Color & Black (BJ-600-800)
JM6 (HP/500) Also supports high Cap. Cart. \$69.95
Also supports high Cap. Cart. \$39.95 Color Jet Ink (2 oz.) (60cc) \$11.50
Black Jet Ink (2 oz.) (60cc) \$10.50 BJ6-MCI Color & Blk (BJ-600/800) \$49.95

Computer Friends

14250 NW SCIENCE PARK DR. PORTLAND, OR 97229
TEL. 503 626 2291 FAX 503 643 5379

CIRCLE 602 ON READER SERVICE CARD

Diskette Duplicator



\$1,895

240 copies per hour using an IBM
PC/AT or compatible. Autoloaders
and labelers are also available.

800-823-4144

RIMAGE Datapath

SOFTWARE DUPLICATION FROM \$.29

Lowest Prices
Will beat anybody's prices
Error free duplication

4-Hour Turn-Around

- Certified High Quality Media
- Printing, Packaging and Fulfillment Services
- Tapes & CD-ROM Duplication

Suicom, Inc.

(800) 724-2666

(510) 438-2666

(510) 770-8658 fax

43272 Christy St., Fremont, CA 94538

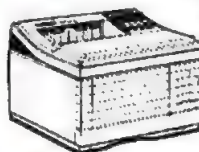
CIRCLE 595 ON READER SERVICE CARD

HP, IBM, Canon, Epson, NEC, Apple

TONER

Cartridge Remanufacturing
for Laser Printers

prices from
\$45
ship incl.



MICR toner, fonts, software
for check printing.

1-800-722-2804

ADVANTAGE Est. 1987
LASER PRODUCTS, INC.

2030 Powers Ferry Rd. Suite 230
Atlanta, GA 30339

CIRCLE 601 ON READER SERVICE CARD

STOP THROWING AWAY

TONER CARTRIDGES

Empty Cartridges Recycled
Guaranteed To Work Like New

From

\$36

FREE U.P.S. PICK-UP & DELIVERY

National Toner
Recycling & Supply

(800) 676-0749

CIRCLE 603 ON READER SERVICE CARD

LET US SHOW YOU WHY

CIRCLE 605 ON READER SERVICE CARD

CIRCLE 606 ON READER SERVICE CARD

CIRCLE 607 ON READER SERVICE CARD

CIRCLE 608 ON READER SERVICE CARD

FREE GIFTS

Download the "SEXIEST" & most "STIMULATING" Images from our ADULT On-Line Magazine - FREE

LACE is an On-Line Magazine that offers you:

- ABSOLUTELY the best Color Photographs and Color Scans in the world & not available on any other BBS!
- GORGEOUS Sexy models both Amateur & Professional!
- VIDEO for Window's Files, the latest & hottest Microsoft Product. Play these Videos on your computer and watch our models come to life for you. One on One. (.AVI)
- LOCAL ACCESS #'s for over 800 cities in the U.S.
- HIGH SPEED access available. (14.4k down to 1200 baud)
- AND... **RATED #1 BY OUR USERS !!**

Set your Modem to 8-N-1 and your terminal emulation to ANSI

(818) 709-4275

Questions? Call our voice line at (818) 709-3795

LACE
the on-line adult magazine

May Only Be Accessed by Adults • Limited Offer

CIRCLE 609 ON READER SERVICE CARD

FREE * ADULT CD-ROM

I want to send you a FREE* Adult CD-Rom that features:

- Sexy Centerfold Models & Couples
- Samples from REG's Adult Titles
- Quality Photographic Images & Color Scans
- An Easy To Use Interactive Window's Viewing Program

*All we ask is that you send \$4.95 to cover our postage and handling.

To receive your FREE* Adult CD-Rom, state age when ordering and mail your request with \$4.95 for postage/handling (Outside U.S. & Canada \$15) to:

REG Publishing - Dept. 3CF
Post Office Box 5138
Chatsworth, CA 91313

To order by telephone call (818) 718-9979. We accept Visa, MasterCard & AMX. Program requires Windows 3.1. Will work with Dos & Mac viewing programs, too! Dealer inquiries invited. Adults Only. Call for a FREE Catalog, too!

Unleash the power of your modem

The Exchange®
Bulletin Board System
The only all-files BBS you'll ever need

Thousands of Free Programs

- Windows
- DOS
- OS2
- Word Processing
- Database
- Games
- Adult Photos (Gifs)
- Animated Adult Movies
- E-Mail
- Live Chat & More

*New! *Free! *Unlimited! *100% Free!

- Local Access from over 600 Cities

Great for beginners & advanced users of all ages

We're only a phone call away!
Modem: 316/576-6550

CIRCLE 613 ON READER SERVICE CARD

FAST DELIVERY! Secret City MULTIMEDIA INC. WORLDWIDE SHIPPING!

FREE CD-ROM ADULT SAMPLER!*

*A TASTE OF EROTICA - 29 SAMPLES OF THE FINEST IN ADULT ENTERTAINMENT, ONLY \$6.75 S/H. PHONE OR MAIL ORDER. WE WILL BEAT ANY ADVERTISED PRICE!

DIRTY DEBUTANTES Interactive.....\$49.99	HIDDEN OBSESSIONS Movie.....\$25.99
DREAM LOVERS GAY Interactive.....\$59.99	MASSIVE M*LLONS Movie.....\$34.99
DREAM MACHINE Interactive.....\$52.99	NEW WAVE H*+K*RS 1, 2 Movie.....\$25.99
HOT WIRE Interactive.....\$49.99	SECRETS Movie.....\$25.99
MADDAMS FAMILY Interactive.....\$45.99	TRACI, I LOVE YOU Movie.....\$25.99
NEURODANCER Interactive.....\$59.99	ADULT PALATE 2 Photos.....\$34.99
NIGHTWATCH 1 Interactive.....\$44.99	AMERICAN GIRLS 1, 2 Photos.....\$29.99
NIGHTWATCH 2 Interactive.....\$49.99	ASIAN HOT PICS Photos.....\$27.99
PENTHOUSE Interactive.....\$74.99	ASIAN PALATE Photos.....\$27.99
SEYMORE BUTTS Interactive.....\$47.99	BODACIOUS BEAUTIES Photos.....\$39.99
SCISSORS & STONES Interactive.....\$59.99	BUSTY BABES 2 Photos.....\$35.99
VIRGINS 1, 2 Interactive.....\$39.99	GAYWORLD 2 GAY Photos.....\$49.99
VIRTUAL VIXENS Interactive.....\$59.99	GBL GAY Photos.....\$39.99
AN*L VISION 1, 2, or 3 Movie.....\$25.99	HOT HUNKS GAY Photos.....\$39.99
ASIAN INVASION Movie.....\$29.99	HOT PEPPERS Photos.....\$19.99
BABY'S GOT B*TT Movie.....\$25.99	HOT PICS Photos.....\$22.99
CURSE OF THE CATWOMAN Movie.....\$25.99	STUDS! GAY Photos.....\$39.99
DEEP T*SH Movie.....\$25.99	T & A TO THE MAXX Photos.....\$12.99
DOUBLE ENTRY Movie.....\$29.99	TRANZ GAY Photos.....\$39.99

MUST BE 21 TO ORDER!

100's OF HOT TITLES IN STOCK! **800-643-4205** **CALL FOR FREE 16-PAGE COLOR CATALOG!**

(818) 786-0995 • FAX (818) 786-7018
581B Van Nuys Blvd., Van Nuys, CA 91401

CIRCLE 610 ON READER SERVICE CARD

STARWARE PUBLISHING CORPORATION

THE ADULT CD-ROM SOURCE

Call 1-800-354-5353 or fax 305-426-9801
Foreign orders call 305-426-4552

Call for our FREE color catalog

ANY 3 MULTIMEDIA MOVIES ONLY \$98

971 After Midnight Screen Saver NEW	\$59.88
986 Adventures of Mikki Finn NEW	\$59.88
(2 disc double spin CD set)	
976 The Other Side of Chelsea	\$49.88
977 Deception	\$49.88
980 Hidden Agenda	\$49.88
975 Beverly Hills 90269	\$49.88
978 Murphie's Brown	\$49.88
979 Fisherman's Wife	\$39.88
954 Wicked	\$39.88
955 Betrayal	\$39.88
956 Cat & Mouse	\$49.88

STARWARE BBS 305-428-0012

CIRCLE 612 ON READER SERVICE CARD

Connecting Gay America by Computer

* Local access from over 800 cities! *Internet E-Mail & news groups!
* Live, uncensored group & private chat! *Online MatchMaker Database!
* Over 20,000 rated files and pictures! *Over 100 lines!

How to Reach EYE CONTACT:

- * For your local access number, call (800) 848-8980 voice, select #2
- * Use your modem to call the number, settings are 8,n,1
- * When you see CONNECT on your screen, press your <Enter> key
- * There will be some scrambled characters on your screen
- * Then type +EC and press your <Enter> key again (EC is our Host Name)
- * Welcome to EYE CONTACT!

Call EYE CONTACT direct by modem at:
(415) 703-8200

For voice assistance call:
(800) 949-2658

EYE CONTACT

EYE CONTACT is Gay owned and operated

TM PUBLISHING presents FREE COMPLETE 64 PAGE ADULT CATALOG WITH EVERY ORDER!

We offer you the Best Adult CD-Roms at the **LOWEST PRICES** available.

Call for the Latest & Best Prices
We'll Match ANY PRICE!

Ask about our DAILY SPECIALS & BUNDLES.

PHONE ORDERS:
1-800-696-9292
FAX: 1-702-796-5855

MUST BE 21 TO ORDER

FOREIGN ORDERS: *10% shipping + *\$5.00 handling	AMX • CASH • CHECK • M.O. • VISA • MC	MAIL TO: TM PUBLISHING PO BOX 17070 DEPT PCM094 LAS VEGAS, NV 89109
*S/H AM REORDERING	NEXT DAY DELIVERY.....\$6.00	
US CURRENCY ONLY	UPS DELIVERY.....\$4.00	
	FEDERAL EXPRESS 2ND DAY.....\$9.00	

NIGHTWATCH Int. on CD7052-\$44.00
NIGHTWATCH 2 Int. on CD7053-\$44.00
WILD INNOCENCE Int. on SP5100-\$49.99
THE LAST GIRL SCOUT Int. on SP5200-\$49.99
THE DREAM MACHINE Int. on CD2011-\$49.00
DEEP THROAT Movie on CD1106-\$29.00
TRACIE I LOVE YOU Movie on CD1106-\$29.00
DEBBIE DOES DALLAS Movie on CD1101-\$29.00
ADULT PALATE VOL 2 Pkx CD9003-\$33.99
HIGH VOLUME NUDES Pkx CD8062-\$24.00
GIRLS OF J.S. HICKS VOL.1 Pkx CD8001-\$24.00

EUROPEAN RELEASE!
PORN MANIA DOUBLE CD Int. on CD1100-\$110.99

Adult Adventures BBS & Shopping Mall On-line
MUST BE 21 TO ORDER: 1-800-203-2828

CIRCLE 611 ON READER SERVICE CARD

HARDWARE/BATTERIES

INCREASE YOUR BATTERY LIFE!

Your "2-Hr" battery only lasts 1 Hr? Try our 3000+ Long-Life Batteries, Chargers & Car Cords, for Notebook, Cellular, Camcorder. Battery Boost Software \$25! Order FREE catalog/guide to longer battery life! Best Prices, 1 Yr Wrrnty, V/MC/PO.

POWER EXPRESS

4976 Stuckey Drive, San Jose, CA 95124-5120
Order 24hrs/Day! 800-769-3739 F408-559-5969

CIRCLE 684 ON READER SERVICE CARD

PERSONAL NETWORKING TUTOR

Introductory Offer \$99!
MS Windows Based Tutorial & Reference System!
Instant Access to THOUSANDS of Network topics.
Tutorials on PC LANs, Client/Server, TCP/IP, ATM & many more! VISA/MC, 30 day money back!

BIGHORN SOFTWARE

Phone: 1-800-475-5445 Fax: (303) 467-2796
P.O. Box 745717, Arvada, CO 80006-5717

CIRCLE 690 ON READER SERVICE CARD

COMMUNICATIONS

ENCRYPTED VOICE

AQUAFONE turns your PC into a secure phone. Uses standard sound card and 9600bps modem. Triple DES, RSA public key, excellent speech quality. Send files while you talk. Minimum 386DX40 or 486SX25, Windows 3.1. \$129 VISA/MC.

COGON Electronics, Inc.

P.O. Box 158 Culpeper, VA 22701
(800) 418-1482 FAX: (703) 349-4604

CIRCLE 696 ON READER SERVICE CARD

DATA BASE

dBASE file access from C, Basic...

CodeBase gives complete database management with multi-user dBASE, FoxPro or Clipper file compatibility from C, C++, Basic or Pascal. Report Writer and Data Entry software is included. Full 60-day money back guarantee.

SEQUITER SOFTWARE INC.

PO BOX 575 New Market, NH 03857-0575
Call (403) 437-2410, Fax (403) 436-2999

CIRCLE 697 ON READER SERVICE CARD

COMPUTER BATTERIES & MORE

Batteries for laptop/NB/PB, CMOS, camcorders, cameras, RC vehicles, toys, cordless phones/drills/shavers, cellular, remotes, pet fences. UPS/LANS, Ni-Cads, chargers, etc. WE REBUILD! CALL & ASK! WHOLESALE! V/MC/AmX/Dscr/POs.

BATTERY EXPRESS

713 Gladstone St., Parkersburg, WV 26101-5661
800-666-2296/304-428-2296 fax: 304-428-2297

CIRCLE 685 ON READER SERVICE CARD

MAKE BETTER DECISIONS

Logical Decisions® for Windows; a powerful tool for analyzing decisions. Evaluate many variables at once, organize data and value judgments, explain your choice. Many other features. Only \$395. Call for free demo.

LOGICAL DECISIONS

1014 Wood Lily Dr., Golden, CO 80401
Phone: (800) 35-LOGIC, Fax: (303) 526-7537

CIRCLE 691 ON READER SERVICE CARD

BOARDS/COMPONENTS/CHIPS

THE FINEST CIRCUIT BOARDS

Manufacturers of the industries finest video cards, motherboards, (w or w/o CPU) and controller cards. By far the best price and tech support ...since 1986. Please call for free catalog.
486/P24T MB w/256KCC & DX2-66 CPU= \$355.

HSB COMPUTER WHOLESALE

34208 Aurora Rd. #297, Cleveland, OH 44139
Tel: 1-800-497-0401 Fax: (216) 498-1374

CIRCLE 686 ON READER SERVICE CARD

CD-ROM TITLES

Best CDROM's from Walnut Creek

Cica MS Win 4000 hot Windows prgrms \$29.95
Giga Games 4000 fun Dos-Windows Games \$39.95
Sintel MSDOS 680 MB DOS Shareware \$29.95
Hobbes OS/2 640 MB Free/Shareware \$29.95
Source Code 650 MB Unix and Dos code \$39.95

Walnut Creek CDROM

Guaranteed! 4041 Pike #D522, Concord CA 94520
VI/MC/AX/Dis 800-786-9907 Fx: 510-674-0821

CIRCLE 692 ON READER SERVICE CARD

DATA ENTRY

The Data Entry Emulator™

Full featured, heads-down data entry with two-pass verification, edit language, operator stats, batch control, output record reformat, on-line help, free tech support. From \$395. LAN version available.

Computer Keyes

21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax: 206-776-7210

COMMUNICATIONS

KEYBOARD, VIDEO, MOUSE

EXTENSION with EXTENDER
SPLITTING with COMPANION
SWITCHING with COMMANDER
Boosts SIGNALS UP to 600 FT. Control Up to 96PC's with one KEYBOARD and MONITOR.

CYBEX CORPORATION

4912 Research Drive, Huntsville, AL 35805
PHONE 205-430-4000 FAX 205-430-4030

CIRCLE 687 ON READER SERVICE CARD

CD-ROMS-MAC-IBM-SEGA-CDTV

Prevue CD-ROMS. We carry all popular formats. Karaoke, Art, Lit, D/Top Publishing, Fonts, Utils, Education, Graphics and above all — GAMES. Apply Prevue to buy or return to prevue more. FREE CATALOG 1-800-433-2938.

WEDGWOOD RENTAL

5316 Woodway Dr., Fort Worth, TX 76133
1-800-433-2938 or 817-292-7353

CIRCLE 693 ON READER SERVICE CARD

ENTERTAINMENT/GAMES

PRO FOOTBALL STATS SYSTEM

Windows 3.1- 1993 & 1994 STATS(\$60 + \$3 shp). Stats for games, players, team, league, coaches. Track your picks, customize team stats. Graphs FREE WEEKLY UPDATES on DELPHI/AMER O/L/C/SERVE or weekly diskettes avail. (\$\$extra).

NEW AGE SOFTWARE

PO BOX 408 HACKETTSTOWN, NJ 07840
1-800-291-2642

CIRCLE 699 ON READER SERVICE CARD

INPUT/DATA ACQUISITION/BAR CODE/POS

BAR CODE DISCOUNT WAREHOUSE

will not be undersold! Your source for all your bar code needs. Laser and CCD scanners, mag stripe and wedge readers, bar code printers and software. We offer major brands at the best prices.
1-800-888-BCDW

BAR CODE DISCOUNT WAREHOUSE

14761 Pearl Rd., #257, Strongsville, OH 44136
Tel: (216) 273-4746 Fax: (216) 273-4623

CIRCLE 688 ON READER SERVICE CARD

FREE CD FREE CD FREE CD

Sample CD-ROM containing fonts, icons, BMP's, clipart and WAV files. Please send \$4.95 for shipping and handling (non-refundable). Other CD's available- fonts and clipart, including World Class Fonts-6000 fonts w/book for \$49.99.

FANTAZIA CONCEPTS, INC.

P.O. Box 5142 Willowick, OH 44095
(216) 951-5666 or (800) 951-0877

CIRCLE 694 ON READER SERVICE CARD

FOREIGN LANGUAGES/ FONT/TRANSLATION

LEADER IN FOREIGN LANGUAGE

WE SET THE STANDARD. Over 100 languages \$25 & up. Translators, tutorials, fonts, spell checkers & related software. Japanese, Chinese, Spanish speaking staff. Call for samples/prices. FREE interactive catalog. LOWEST PRICES GUARANTEED.

CHARACTER LANGUAGE RESOURCE

2130 Sawtelle Blvd. #304A, Los Angeles, CA 90025
800-569-2099/310-996-2300/FAX 310-996-2303

CIRCLE 700 ON READER SERVICE CARD

SOFTWARE/BUSINESS APPLICATION

THE EASIEST OF THEM ALL™

Full featured FoxPro based Integrated Accounting for PC's. Faster, More Complete and Easier to Use. See PC Magazine May 12, 1992. Only \$295.00 Call for free info kit, demo disk and upgrade offer.

PC ACCOUNTANT™

P.O. Box 2278, Kirkland, WA 98083
800-827-1303 206 827-4361

CIRCLE 689 ON READER SERVICE CARD

THE MULTIMEDIA SOURCE!

The Exciting world of Multimedia at INTERVISION (formerly Plato's Express). Hundreds of the latest CD ROM titles UPGR Kits, Video Capture Boards, Sound Cards. Call for FREE CATALOG! Adult Only CD Also Available.

INTERVISION

13122 NE 20th #C., Bellevue, WA 98005
800-877-4355 or FAX 206-861-0533

CIRCLE 695 ON READER SERVICE CARD

MAILING LIST MANAGEMENT

Save \$\$\$ on Your Mailings!

Postalsoft DeskTop Mailer helps you save on postage and automate mailings! Correct addresses & add ZIP+4; presort 1st/3rd Class mail; manage lists & find dupes; print barcoded labels—all from an easy-to-use Windows interface.

Postalsoft, Inc.

4439 Mormon Coulee Rd, La Crosse WI 54601
TEL: (800) 831-MAIL(6245) FAX: (608) 788-1188

CIRCLE 701 ON READER SERVICE CARD

MAILING LIST MANAGEMENT

Mail Order Manager (™)

America's favorite integrated solution for mail/phone order business - order entry, credit card processing, UPS manifest, accounting, telemkt'g, mailing list mgmt & more! Single & Multi-user systems starting at \$1195. Working Demo \$25 (Ref)

Dydacomp Development Corp.

150 River Road, Ste N1 Dept.PCM, Montville, NJ 07045 Tel:800-858-DMOM or 201-335-1256

CIRCLE 702 ON READER SERVICE CARD

PROGRAMMING TOOLS/LANGUAGES

Visual Basic Programming Tools

Add-on tools for VB, VB_DOS, QuickBASIC and PDS, all with tutorials and full source. Custom controls, DLL's, general purpose toolboxes, assembly routines, graphics, screen design, TSR's and much more. No royalties. Free demo & catalog.

CRESCENT SOFTWARE, INC.

11 Bailey Avenue, Ridgefield, CT 06877-4505
1-800-35BASIC 203-438-5300 Fax:203-431-4626

STATISTICAL/RESEARCH

#1 in Surveys - StatPac Gold IV

Professional's choice for survey & marketing research. User-friendly, comprehensive & dependable. Camera ready tables & graphics. Basic & advanced statistics. CRT & telephone interviewing. Easiest to learn. Guaranteed.

StatPac Inc.

4532 France Ave. S., Minneapolis, MN 55410
Tel: (612) 925-0159 Fax: (612) 925-0851

CIRCLE 714 ON READER SERVICE CARD

MANUFACTURING/INVENTORY

MAINTENANCE MANAGEMENT

PC-based system for the small to medium size business. FEATURES: Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Write for free Demo!!

PENGUIN COMPUTER CONSULTANTS

P.O.Box 20485, San Jose, CA 95160
800-521-0545 (408)997-7703 Fax (408)927-0570

CIRCLE 703 ON READER SERVICE CARD

Fortran 90 and 77

• New! 32-Bit Fortran 90 • FORTRAN 77 for Students and Professionals • Downsizing or New Code • Complete Suite of Tools • Free Technical Support • A Decade of PC Fortrans

Lahey Computer Systems

800-548-4778 or 702-831-2500
Fax: 702-831-8123

CIRCLE 709 ON READER SERVICE CARD

The Survey System

Analyzes:marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail or computer interviews. Records verbatim text & voice answers. Powerful, flexible, user friendly. Free support.

Creative Research Systems

140 Vista View #100, Petaluma, CA 94952-4728
Ph.(707)765-1001/Fax (707)765-1068

CIRCLE 715 ON READER SERVICE CARD

INVENTORY MANAGEMENT

Stock-Master 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.

177F Riverside Ave., Newport Beach, CA 92663
714-759-0582

CIRCLE 704 ON READER SERVICE CARD

PROFESSIONAL PROGRAMMERS!

AccSys libraries offer access to dBASE and Paradox files. Network ready. Multi-platformed. Develop applications for DOS, DOS Extenders, OS/2, Windows (DLL). Popular compilers supported. Demo Call 708-924-3030. Request 889835

COPIA INTERNATIONAL LTD.

1342 Avalon Ct., Wheaton, IL 60187
708-682-8898 FAX: 708-665-9841

CIRCLE 710 ON READER SERVICE CARD

NCSS 5.x Series - \$125

"Best value & easiest to learn/use" PC-Week. Menus/Spreadsheet. Means, etc. Regression, t-tests, ANOVA. Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS

329 North 1000 East, Kaysville, UT 84037
Phone: 801-546-0445 FAX: 801-546-3907

CIRCLE 716 ON READER SERVICE CARD

MEDICAL/DENTAL

E-Claims for Windows™ \$99

Transmit medical claims over modem. Windows WYSIWYG claim image for easy entry and fast retrieval of all claims. Tracks amt due & pmts. Client/Server LAN, import, direct submission & upgrades to full office mgmt system available.

Medical Business Automation Inc.

2047 Old Middlefield, Mt View CA 94043
Healthware™ Since 1983. (800) 456-2622

CIRCLE 705 ON READER SERVICE CARD

REAL ESTATE

Property Management

With Rental-Ease save \$\$ on your investment! Guaranteed to be the easiest & fastest property management system available at any price. Versions for owners, professionals, networks. \$395 to \$1295. Demo \$10. Dealers welcome!

Strategic Office Systems

688 N.500 W.#61, Mt. Pleasant, UT 84647
(800) 942-6784 or (801) 462-2130

CIRCLE 711 ON READER SERVICE CARD

SERVICES/COMPUTER INSURANCE

Insures Your Computer

The COMPUTEROWNERS™ insurance policy repairs or replaces hardware, media and purchased software. Rates as low as \$49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. 1-800-800-1492.

Safeware, The Insurance Agency Inc.

2929 N. High St., PO Box 02211, Columbus, Ohio 43202
1-800-SAFWARE

CIRCLE 717 ON READER SERVICE CARD

RELIGION

CHURCH MANAGEMENT SOFTWARE

Membership, contributions and accounting software that saves big on church mailing costs with bar codes and carrier routes. PowerChurch Plus includes church fund accounting, A/P and payroll for \$795. Call today to order free info in the mail.

F1 SOFTWARE

208 Ridgefield Drive, Asheville, NC 28806
1 (800) 486-1800

CIRCLE 712 ON READER SERVICE CARD

SCANNING/SERVICES

FOR HIRE - TYPIST - 2,400 WPM

•Fast, Accurate, Inexpensive. Overnite Svc Avail
•Any paper-docs, financials, lists, mnscrip, etc.
•Converted to file for any PC or MAC program.
•Output to diskette, CD-ROM, or tape.
•Complete Scanning/OCR/Imaging services

ScanType Service Corp.

6557 Via Barona, Carlsbad, CA 92009
(800) 597-SCAN In CALIF: (800) 300-SCAN

CIRCLE 718 ON READER SERVICE CARD

MISC. BOOKS/CATALOGUES

COMPUTER BOOK STORE

Now on the Internet! 15% off books from 140 publishers. CD-ROMs, Windows, Internet, Macintosh, UNIX. Download catalog from CompuServe (GO CBK). Electronic catalogs avail. by anonymous FTP from ftp.compupubs.com. Worldwide shipping.

CompuBooks

RR 1 BOX 271D, Cedar Creek TX 78612 USA
512-321-9652 FAX321-4525 Orders800-880-6818

We Make It So Easy—

Leave your business card with us and we'll do the rest. PC Magazine will create your BusinessCard for you. It's so easy—and so very effective.

BusinessCard

Call your BusinessCard representative today.
1-800-825-4237

Bible Study Software

For 10 years we have remained the leading Bible study software company. Think of us as a Bible bookstore with an integrated family of software products for your Bible study needs! Call for a FREE catalog!

Bible Research Systems

2013 Wells Branch Pkwy. #304 Austin, TX 78728
1-800-423-1228 1-512-251-7541

FOR QUICKER RESPONSE
FAX TO
(609) 829-0692

**Free Product
Information**

BUSINESS REPLY MAIL

FIRST CLASS MAIL

PERMIT NO. 433

RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 1687
RIVERTON, NJ 08077-9687

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions.

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.

3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after February 28, 1995

001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047	048	049	050		
051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100		
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150		
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200		
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250		
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300		
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350		
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400		
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450		
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500		
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550		
551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600		
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650		
651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700		
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750		
751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800		
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850		
851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900		
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950		
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999			

1. Do you work in a DP/MIS dept.?

01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity. (Check one)

01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer-Aerospace
03. ☐ Manufacturer-Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities

17. ☐ Non-Computer Retailer/Dist.

18. ☐ Other Business or Service

3. Please indicate your primary business function. (Check one)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?

01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products?

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?

01. ☐ Linked to mainframe
02. ☐ Linked to mini
03. ☐ Networked together

7. Please check the equipment currently installed at your location. (Check all that apply.)

01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh
05. ☐ CD-ROM
06. ☐ Windows

8. Do you plan to buy any PC products?

01. ☐ Now 03. ☐ In 7 to 12 months
02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:

01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000 or more
02. ☐ 26-99 04. ☐ 500-999

Name

Title

Company Name

Address

City

Telephone

State

Zip

5. Please send me a one-year (22-issue) subscription to PC Magazine for \$34.97 (U.S. price); all other countries add \$36.00 for additional postage.

In a Hurry? Fax This Card To: 609-829-0692

PC 10/25-5



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions.

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.

3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Valid after February 28, 1995

001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047	048	049	050			
051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100			
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150			
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200			
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250			
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300			
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350			
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400			
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450			
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500			
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550			
551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600			
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650			
651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700			
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750			
751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800			
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850			
851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900			
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950			
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999				

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)

01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer—Aerospace
03. ☐ Manufacturer—Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11. ☐ Research and Development
12. ☐ Data Processing/Computer Service
13. ☐ Health/Medical/Legal Service
14. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities
17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?

01. ☐ Linked to mainframe
02. ☐ Linked to mini
03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)

01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh
05. ☐ CD-ROM
06. ☐ Windows

8. Do you plan to buy any PC products?

01. ☐ Now 03. ☐ In 7 to 12 months
02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:

01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000 or more
02. ☐ 26-99 04. ☐ 500-999

Name

PC 10/25-5

Title

Telephone

Company Name

Address

City

State

Zip

5. ☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$34.97 (U.S. price); all other countries add \$36.00 for additional postage

In a Hurry? Fax This Card To 609-829-0692

FOR QUICKER RESPONSE

FAX TO
(609) 829-0692

Free Product Information

BUSINESS REPLY MAIL

FIRST CLASS MAIL

PERMIT NO. 433

RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

P.O. Box 1687
RIVERTON, NJ 08077-9687NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



Advertising Sales Staff

One Park Avenue,
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Dan Rosenweig - Associate Publisher
(212) 503-5354
Anna Zornosa - Associate Publisher/West Coast
(415) 378-5505
Lon Otremba - Associate Publisher/East Coast
(212) 503-4453
Bill Stephen National Sales Manager
(212) 503-5626
Ad Coordination Supervisor
Christine Holsten
(212) 503-5264
Advertising Coordinator
Julie Eigo
(212) 503-5107

NETWORK EDITION

Kimberly White - Eastern Advertising Manager/Network Products - Eastern Region & Midwest
(617) 393-3056
Account Representative
Andrew Zeiger
(212) 503-5162
Paul Klein - Western Advertising Manager/Network Products - Western Region & Southwest
(415) 378-5546
Account Representative
Tim Castelli
(212) 503-5125

MA, NH, VT, ME, RI, Canada

District Sales Manager
Michael Bird (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
(617) 393-3055
Account Representative
Kirk McDonald
(212) 503-5970

CT, NY, NJ, PA

District Sales Manager
Todd Anderman (212) 503-5149
One Park Avenue, 4th Floor
New York, NY 10016
(212) 503-5100
Account Representative
Elizabeth Cusick
(212) 503-5112

DE, MD, DC, VA, WV, NC, SC, AL, MS, TN, AR, KY, GA, FL

District Sales Manager
Frank Quigley (404) 814-8950
3405 Piedmont Road NE, Suite 460
Atlanta, GA 30305
(404) 814-8940
Account Representative
Lynn Bader
(212) 503-5032

NE, WI, IL, IN, KS, MN, MO, MI, IA, ND, SD, OH

District Sales Manager
Ken Beach (312) 214-7330
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 214-7300
Sr. Account Representative
Beth Boyle
(212) 503-5047

TX, OK, LA, NM

District Sales Manager
Tim Colby (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 360-5700
Sr. Account Representative
Stephanie Brzozowski
(212) 503-5675

Mark Malloy - Southwest Area Manager
(310) 268-1331

CA (Los Angeles), AZ

District Sales Manager
Julie York (310) 268-1381
11766 Wilshire Blvd., Suite 1550
Los Angeles, CA 90025
(310) 268-1300
Account Representative
R.J. Kirkland
(212) 503-5113

CA (San Diego & Orange County), HI

District Sales Manager
Robin Kofsky (714) 852-5920
18301 Von Karmen Avenue, Suite 330
Irvine, CA 92715
(714) 852-5914
Account Representative
Elizabeth O'Connor
(212) 503-5040

CA (San Jose), ID

Senior District Sales Manager
Michael Klein (415) 378-5521
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Wendy Nathan
(212) 503-5024

Mike Kisseberth - Northwest Area Manager
(415) 378-5510

CA (San Francisco & North), OR, WA, NV

District Sales Manager
Ira Becker (415) 378-5523
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Jeff Green
(212) 503-5129

CA (South San Francisco to Mountainview), CO, UT, WY, AK, MT

District Sales Manager
Kristy Newton (415) 378-6859
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Jennifer Williams
(212) 503-5011

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader
Director of Sales and Marketing
Paul Fusco
Sales Manager
Monte Wasch
Production Director
Vicki Egan
Sr. Production Coordinator
Nadine Messier
Sr. Production Coordinator
Berhan Asmarom
Advertising Coordinator
Audi Marie Tinoso

AL, AR, FL, GA, LA, MS, NC, SC, TN, TX, WV, KY

Account Manager
Leslie Eddy
(212) 503-5171

AK, AZ, CA (209, 213, 310, 619, 714, 805, 818, 909), NM, OK, HI

Account Representative
Carolyn Goldfarb
(212) 503-5076

CT, IA, IL, IN, ME, MI, NH, JN, RI, VT, WI

Sr. Account Representative
Bill Herbst
(212) 503-5193

CA (209, 408, 410, 415, 707, 916)

Account Representative
(212) 503-5118

DC, NY, PA, DE, MD, OH, MO, VA, CN, Foreign

Account Representative
James Meyer
(212) 503-5150

CO, ID, KS, MN, MT, ND, NE, NV, OR, SD, UT, WA, WY

Account Representative
Maggie Hewit
(212) 503-5156
Business Card Advertising
Call: 1-800-825-4237
PC Magazine Marketplace
3rd Floor, One Park Ave.
New York, NY 10016

For more information regarding display advertising please call:
212 503-5100
1-800-33MAG AD

For more information regarding central advertising please call:
212 508-5115
1-800-825-4237

Send your message around the world...



...and celebrate its return.

PC Magazine has Licensed Editions all over the world.

By advertising with the most trusted name in computer publishing, you can open new markets and conquer the world. For information on these foreign editions, contact the Ziff-Davis Licensing Department:

Tel: 212-503-5422 Fax: 212-503-5420



Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
293	3 Com Corporation	13
910	3M Data Storage Products	NE40
034	Acer America	81-85
087	Acer America	190-191
934	Adaptec	NE38
226	ADI Systems Inc.	60
905	Allied Telesis	NE26
*	America Online, Inc.	183-184
162	American Power Conversion	89
025	American Small Business Computers	375
270	AMS	276
235	AMS	378
336	Arlington Computer Products	357-359
*	AST Research	20-21
*	AST Research	90-91
*	AST Research	212-213
*	At&T	139-141
127	ATI Technologies Inc.	5
012	Austin Direct	229-231
325	Austin Direct	367
*	Autodesk Inc.	235
287	Borland International	6
220	Borland International	67-70
015	Bulldog Computer Products	376
*	Caere Corporation	215
*	Caere Corporation	217
292	Caere Corporation	219
341	Calera Recognition System	259
*	Canon Computer Systems	53
187	Canon, U.S.A.	251
872	Combinet	NE23
308	Compaq Computer Corporation	74-75
*	Compaq Computer Corporation	117-119
*	Compaq Computer Corporation	204
126	CompuAdd	284-285
144	CompUSA Direct	256-257
300	Computability	318-319
348	Computer Associates	2-3
075	Computer Associates	420
159	COMPUTER DISCOUNT WAREHOUSE	344-345
360	COMPUTER DISCOUNT WAREHOUSE	346-347
158	Computer Library	166
322	Corel Corporation	41
020	Corel Corporation	158
011	Corel Corporation	258
084	Creative Labs	110-111
086	Creative Labs	122-123
329	CTX International	169
369	CTX International	266
932	Datapoint Corporation	NE27
*	DEE ONE SYSTEMS	379
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	163-165
*	Dell Computer Corporation	314-315
050	Delphi Internet Services	86

Reader Service No.	Advertiser	Page
176	Diamond Computer Systems, Inc.	273
*	Digital Equipment Corporation	225-226
*	Digital Equipment Corporation	NE4
*	Epson America	10-11
090	Everex Computer Systems	180
305	ExpoTech/VTech	370-373
*	Farallon Computing	NE2-NE3
014	First Source International	350-351
089	FOSA Computer Inc.	334
200	FTG Data Systems	4
*	Gateway 2000	49
*	Gateway 2000	64-65
*	Gateway 2000	48a-1
371	Goldstar	260
391/138	H.Co Memory Upgrades	356
136	Hayes Microcomputer Products	51
*	Hewlett Packard Peripheral Group	96-97
*	Hewlett Packard Peripheral Group	186-187
*	Hewlett Packard	33
*	Hewlett Packard	58-59
*	Hewlett Packard	108-109
*	Hewlett Packard	144-145
*	Hewlett Packard	NE9
*	IBM Corporation	203
*	IBM PC Corporation	170-171
033	Inset Systems Inc.	101
219	Insight Direct, Inc.	354-355
027	Insight Direct, Inc.	418
*	Intel Corporation	147-150
*	Intel Corporation	238-241
882	Intel Corporation	NE10-NE11
928	Intel Corporation	NE31
048	Intergraph Corp.	220
358	Intergraph Corp.	265
242	Kenosha Computer Center	348
106	Kingston Technology	98
019	L.A. Trade	374
*	Lotus Development Corporation	76-77
*	Lotus Development Corporation	173-178
067	Mag Innovision	23
018	MegaHaus	353
855	Micro Solutions Computer Products	262
893	Microcom	NE25
230	Micrografx	248
119	Micron Computer, Inc.	102-106
*	Microsoft	78
*	Microsoft	C2-C4,p1
*	Microsoft	194-195
010	Midwest Computer Works	352
398	Midwest Micro	321-328
280	Mitsubishi Display Products	214
177	MPC Technology, Inc.	94
283	Nanao Corporation	43
045	NEC Technologies	26-27
877	NetManage, Inc.	NE22

Reader Service No.	Advertiser	Page
922	Network General	NE34
032	Nissei Sangyo America	55
858	NOTIS Systems, Inc.	336
890	Novell, Inc.	NE19-NE21
*	Oracle Corp.	NE12-NE13
*	PC Connection	331-333
080	PC Power & Cooling	100
199	PC Zones	342-343
092	PCs Compleat	338-339
268	PCs Compleat	340-341
024	PerComp Microsystems, Inc.	368-369
867	Performance Technology	NE24
246	Phillips	233
916	Photonics	NE15
098	Pinnacle Micro	335
148	Primavera Systems	45
375	Publishers Toolbox	337
899	QMS	NE7
884	QMS	NE36
002	QuickShot Technology	80
047	Roland Corporation	153
046	Samsung Information Systems	253
*	Scitor Corporation	63
399	Sigma Designs, Inc.	425
150	SmartPrint/Dresselhaus	288
043	SPSS, Inc.	377
909	Standard Microsystems Corporation	NE32
057	StatSoft	57
081	Sunshine Computers	364
334	Symantec Corporation	28
851	Symantec Corporation	NE16
008	Tagram Systems Corporation	155
357	TC Computers	366
001	Tektronix Inc.	24-25
304	Texas Instruments	34-35
368	Texas Instruments	244-245
379	Toshiba America	189
029	Twinhead Corporation	349
920	US Robotics Inc.	36
051	USA Flex	360-361
210	USA Flex	362-363
343	Valueline	365
118	View Sonic	72
373	Visual Software	156
*	WordPerfect Corporation	14-18
211	Xircom	137
*	Zenith Data Systems	208-209
038	Zeos Int'l	82
155	Zeos Int'l	129-134
151	Zeos Int'l	197-200
*	Ziff Davis Corporate Marketing	380-381
354	Ziff Davis Magazine Network	306-307

* No Reader Service #. Please Call Advertiser For Information.

Advertisers' Index PRODUCTS

Reader Service No.	Company	Product	Page
ADD-ON BOARDS			
015	Bulldog Computer Products	Mail Order, Hardware, Peripheral	376
086	Creative Labs	Sound Card Family	122-123
176	Diamond Computer Systems, Inc.	Stealth 64	273
391/138	H Co Memory Upgrades	Memory, PCMCIA	356
002	QuickShot Technology	Sound Card, Speakers	80
357	TC Computers	Mail Order	366
ANTI-VIRUS SOFTWARE			
851	Symantec Corporation	Disklock - LAN Campaign	NE16
AUDIO BOARDS			
086	Creative Labs	Sound Card Family	122-123
047	Roland Corporation	Sound Canvas Daughter Board	153
BACKUP SOFTWARE			
855	Micro Solutions Computer Products	Tape Backup	262
BOOKS			
416	Microsoft	Microsoft Press	78
BRIDGES/ROUTERS/GATEWAYS			
872	Combinet	Bridges/Routers	NE23
CAD/CAM			
025	American Small Business Computers	DesignCAD 2D for Windows	375
0	Autodesk Inc.	AutoCAD LT	235
358	Intergraph Corp.	Microstation	265
CD-ROM			
015	Bulldog Computer Products	Mail Order, Hardware, Peripheral	376
300	Computability	Mail Order	318-319
150	Computer Library	Computer Select	166
020	Corel Corporation	Corel Flow	158
219	Insight Direct, Inc.	CD-ROM	354-355
027	Insight Direct, Inc.	CD-ROM	418
855	Micro Solutions Computer Products	CD-ROM	262
357	TC Computers	Mail Order	366
343	ValueLine	Mail Order, Peripherals	365
CHIPS/PROCESSORS			
391/138	H Co Memory Upgrades	Memory, PCMCIA	356
0	Intel Corporation	Intel Tech Series	147-150
0	Intel Corporation	Intel Overdrive	238-241
019	L.A. Trade	Memory	374
COMMUNICATIONS SOFTWARE			
893	Microcom	LANexpress	NE25
858	NOTIS Systems, Inc.	Graphical User Interface	336
COMPUTERS/COMPATIBLES			
034	Acer America	PCs and Notebooks	81-85
336	Arlington Computer Products	Mail Order, Peripherals	357-359
0	AST Research	Notebook Computers	20-21
0	AST Research	Desktops	90-91
0	AST Research	Notebook Computers	212-213
0	AT&T	AT&T GIS PC/Server	139-141
012	Austin Direct	Austin Desktops & Notebooks	229-231
325	Austin Direct	Mail Order	367
308	Compaq Computer Corporation	Prokant	74-75
0	Compaq Computer Corporation	Desktops and Notebooks	118-119
0	Compaq Computer Corporation	Desktops	204
126	CompuAdd	Family Pentium Products	284-285
144	CompUSA Direct	Mail Order	256-257
0	DEE ONE SYSTEMS	Systems	379
0	Dell Computer Corporation	Dell Systems	C5-C8
0	Dell Computer Corporation	Dell Systems	314-315
0	Digital Equipment Corporation	Systems	225-226
305	ExpoTech/VTech	486 DX2/50 Mhz, 486 SX/25 Mhz	370-373
0	Gateway 2000	PCs	49
0	Gateway 2000	PCs	64-65
0	Gateway 2000	PCs	48a-1
0	Hewlett Packard	HP Vectra PCs	58-59
0	Hewlett Packard	HP Vectra PCs	106-109
0	Hewlett Packard	HP Vectra PCs	144-145
119	Micron Computer, Inc.	Micron PCs	102-106
010	Midwest Computer Works	PCs	352
390	Midwest Micro	Desktop Systems	321-328
092	PCs Complete	Mail Order	338-339
268	PCs Complete	Mail Order	340-341
024	PerComp Microsystems, Inc.	Mail Order	368-369
081	Sunshine Computers	Notebooks/Laptops	364
008	Targem Systems Corporation	Desktop Computers	155
379	Toshiba America	Notebook Computers	189
051	USA Flex	Desktops	360-361
210	USA Flex	Desktops	362-363
343	ValueLine	Mail Order, Peripherals	365
0	Zenith Data Systems	Z-Noteflex/Multimedia	208-209
038	Zeos Int'l	AMBRA 486 Desktops	92
155	Zeos Int'l	Zeos Pentium	129-134
151	Zeos Int'l	Mendian	197-200
DATA BASE MANAGERS			
287	Borland International	Paradox for Windows	6
220	Borland International	dBase	67-70
0	Microsoft	Microsoft Access	194-195
0	Oracle Corp.	Workgroup Server	NE12-NE13
DESK TOP PUBLISHING			
322	Corel Corporation	Ventura 5	41
011	Corel Corporation	Corel Draw 4	258
DISK BACKUP & TAPE DRIVES			
910	3M Data Storage Products	3M Data Storage Products	NE40
300	Computability	Mail Order	318-319
018	MegaHaus	Drives/Storage	353
855	Micro Solutions Computer Products	Tape Backup	262
343	ValueLine	Mail Order, Peripherals	365

Reader Service No.	Company	Product	Page
DISPLAYS/MONITORS			
226	ADI Systems Inc.	Monitors	60
015	Bulldog Computer Products	Mail Order, Hardware, Peripheral	376
144	CompUSA Direct	Mail Order	256-257
329	CTX International	Monitors	169
371	Goldstar	1520 & 1725 Monitors	260
087	Mag Innovation	Monitors	23
010	Midwest Computer Works	Monitors	352
280	Mitsubishi Display Products	Mitsubishi Diamond Pro 15FS	214
283	Nanao Corporation	Monitors	43
032	Nisse Sangyo America	Monitors	55
248	Philips	Magnavox CM4015 15" Monitor	233
046	Samsung Information Systems	Monitors	253
343	ValueLine	Mail Order, Peripherals	365
118	View Sonic	Monitors	72
EMULATORS/PROTOCOL CONVERTERS			
922	Network General	Expert Sniffer	NE34
FAX/MODEM			
106	Kingston Technology	Portable Products	98
357	TC Computers	Mail Order	366
FILE SYSTEMS & ACCESS METHODS			
033	Inset Systems Inc.	Hack Graphics Suite V.3.0	101
FINANCIAL PLANNING SOFTWARE			
075	Computer Associates	CA-Simply Money	420
FLOWCHARTING			
020	Corel Corporation	Corel Flow	158
GRAPHICS SOFTWARE			
0	Caere Corporation	OmniPage	215
0	Caere Corporation	OmniPage	217
292	Caere Corporation	OmniPage	219
011	Corel Corporation	Corel Draw 4	258
858	NOTIS Systems, Inc.	Graphical User Interface	336
375	Publishers Toolbox	Graphics Products	337
373	Visual Software	Visual Reality	156
HARD DRIVES			
300	Computability	Mail Order	318-319
0	DEE ONE SYSTEMS	Hard Drives	379
219	Insight Direct, Inc.	Hard Drives	354-355
027	Insight Direct, Inc.	Hard Drives	418
018	MegaHaus	Drives/Storage	353
855	Micro Solutions Computer Products	Disk Drives	262
HARDWARE			
0	Canon Computer Systems	Canon Printers	53
144	CompUSA Direct	Mail Order	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	346-347
0	Hewlett Packard	100VG	NE9
106	Kingston Technology	Portable Products	98
018	MegaHaus	Drives/Storage	353
010	Midwest Computer Works	Hardware	352
398	Midwest Micro	Desktop Systems, Notebooks	321-328
199	PC Zones	Mail Order	342-343
HUBS			
0	Hewlett Packard	100VG	NE9
IMAGE EDITING SOFTWARE			
230	Micrografx	Designer	248
INPUT DEVICES			
200	FTG Data Systems	Input/Output Devices	4
INTEGRATED SOFTWARE			
0	Lotus Development Corporation	SmartSuite	173-178
LAN ADAPTER BOARDS			
293	3 Com Corporation	Ethernet PCMCIA Adapter Cards	13
0	Farallon Computing	Etherwave Family	NE2-NE3
106	Kingston Technology	Portable Products	98
916	Photonics	PCMCIA Network Adapters	NE15
357	TC Computers	Mail Order	366
LAPTOPS/PORTABLE COMPUTERS			
034	Acer America	PCs and Notebooks	81-85
270	AMS	Notebooks	276
235	AMS	Notebooks	378
0	AST Research	Notebook Computers	20-21
0	AST Research	Notebooks	90-91
0	AST Research	Notebook Computers	212-213
0	Austin Direct	Austin Desktops & Notebooks	229-231
325	Austin Direct	Mail Order	367
0	Compaq Computer Corporation	Contura	117
0	Compaq Computer Corporation	Desktops and Notebooks	118-119
144	CompUSA Direct	Mail Order	256-257
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	346-347
369	CTX International	Notebooks	266
0	Dell Computer Corporation	Dell Systems	C5-C8
0	Dell Computer Corporation	Dell Portables	163-165
0	Dell Computer Corporation	Dell Systems	314-315
0	Digital Equipment Corporation	Systems	225-226
090	Everex Computer Systems	Everex STEP Note	180
305	ExpoTech/VTech	Notebooks	370-373
089	FOSA Computer Inc.	Portables	334
0	Gateway 2000	Notebooks	49
0	Gateway 2000	Notebooks	64-65
0	Gateway 2000	Notebooks	48a-1
398	Midwest Micro	Notebooks	321-328
177	MPC Technology, Inc.	Multimedia Notebooks	94
045	NEC Technologies	Versa S	26-27

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
081	Sunshine Computers	Notebooks/Laptops	364
304	Texas Instruments	TI TravelMate Notebooks	34-35
379	Toshiba America	Notebook Computers	189
029	Twinhead Corporation	Slimnote	349
051	USA Flex	Notebooks	360-361
210	USA Flex	Notebooks	362-363
•	Zenith Data Systems	Z-Note/Note/Multimedia	208-209
151	Zeos Int'l	Mendian	197-200

LOCAL AREA NETWORKS

293	3 Com Corporation	Ethernet PCMCIA Adapter Cards	13
905	Allied Telesis	Networking Products	NE36
144	CompUSA Direct	Mail Order	256-257
300	Computability	Mail Order	318-319
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	346-347
•	Digital Equipment Corporation	Storage Works	NE4
•	Hewlett Packard	100VG	NE9
882	Intel Corporation	Flash C	NE10-NE11
833	Microcom	LANexpress	NE25
890	Novell, Inc.	NetWare Connect	NE19-NE21
867	Performance Technology	POWERLAN 3.0	NE24
•	Zenith Data Systems	Z-Note/Note/Multimedia	208-209

MAIL ORDER

034	Acer America	PCs and Notebooks	81-85
025	American Small Business Computers	DesignCAD 2D for Windows	375
270	AMS	Notebooks	276
235	AMS	Notebooks	378
•	Arlington Computer Products	Mail Order, Peripherals	357
336	Arlington Computer Products	Mail Order, Peripherals	357-359
•	AT&T	AT&T GIS PC Server	139-141
012	Austin Direct	Austin Desktops & Notebooks	229-231
325	Austin Direct	Mail Order	367
015	Buildog Computer Products	Mail Order, Hardware, Peripheral	376
•	Compaq Computer Corporation	Contura	117
•	Compaq Computer Corporation	Desktops and Notebooks	118-119
•	Compaq Computer Corporation	Deskpro	204
126	CompuAdd	Family Pentium Products	284-285
300	Computability	Mail Order	318-319
•	Digital Equipment Corporation	Systems	225-226
305	ExpoTech/VTech	486 DX2/50 Mhz, 486 SX/25 Mhz	370-373
014	First Source International	Memory, Software, Peripherals	350-351
•	Gateway 2000	Mail Order	49
•	Gateway 2000	Mail Order	64-65
•	Gateway 2000	Mail Order	48a-1
391/138	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	356
219	Insight Direct, Inc.	Mail Order	354-355
027	Insight Direct, Inc.	Mail Order	418
242	Kenosha Computer Center	Mail Order	348
018	MegaHaus	Drives/Storage	353
010	Midwest Computer Works	Mail Order	352
•	PC Connection	Mail Order	331-333
199	PC Zones	Mail Order	342-343
092	PCs Complete	Mail Order	338-339
268	PCs Complete	Mail Order	340-341
024	PerComp Microsystems, Inc.	Mail Order	368-369
867	Performance Technology	POWERLAN 3.0	NE24
375	Publishers Toolbox	Mail Order	337
081	Sunshine Computers	Notebooks/Laptops	364
008	Tagram Systems Corporation	Desktop Computers	155
357	TC Computers	Mail Order	366
051	USA Flex	Notebooks/PCs/Peripherals	360-361
210	USA Flex	Notebooks/PCs/Peripherals	362-363
343	ValueLine	Mail Order, Peripherals	365
038	Zeos Int'l	AMBRA 486 Desktops	92
155	Zeos Int'l	Zeos Pandora Pentiums	129-134
151	Zeos Int'l	Mendian	197-200

MASS STORAGE

300	Computability	Mail Order	318-319
•	Digital Equipment Corporation	Storage Works	NE4
018	MegaHaus	Drives/Storage	353

MEMORY

014	First Source International	Memory, Software, Peripherals	350-351
391/138	H Co Memory Upgrades	Memory	356
019	L.A. Trade	Memory	374

MISCELLANEOUS

•	Ziff Davis Corporate Marketing	Ziff Davis TV	380-381
354	Ziff Davis Magazine Network	Ziff Magazine Network	306-307

MODEMS

300	Computability	Mail Order	318-319
138	Hayes Microcomputer Products	OPTIMA PCMCIA	51
920	US Robotics Inc.	Courier Modem	36
217	Xircom	Ethernet & Modems	137

MULTI-MEDIA

325	Austin Direct	Mail Order	367
020	Corel Corporation	Corel Flow	158
084	Creative Labs	MUKS	110-111
086	Creative Labs	Sound Card Family	122-123
219	Insight Direct, Inc.	Multimedia	354-355
027	Insight Direct, Inc.	Multimedia	418
177	MPC Technology, Inc.	Multimedia Notebooks	94
002	QuickShot Technology	Sound Card, Speakers	80
047	Roland Corporation	Sound Canvas Daughter Board	153
399	Sigma Designs, Inc.	Video Capture Board	425

MULTIMEDIA SOFTWARE

373	Visual Software	Visual Reality	158
-----	-----------------	----------------	-----

NETWORK INTERFACE CARDS

•	Parallon Computing	Etherware Family	NE2-NE3
882	Intel Corporation	Flash C	NE10-NE11
909	Standard Microsystems Corporation	Ethernet Cards	NE32

Reader Service

No.	Company	Product	Page
NETWORKING SOFTWARE			
348	Computer Associates	Unicenter	2-3
•	IBM PC Corporation	MarketViews	170-171
928	Intel Corporation	Intel LANdesk Manager	NE31
877	NetManage Inc.	Chameleon 4.0	NE22
•	Oracle Corp.	Workgroup Server	NE12-NE13
867	Performance Technology	POWERLAN 3.0	NE24

OCR PRODUCTS

341	Calera Recognition System	WorldScan Plus	259
-----	---------------------------	----------------	-----

ON LINE DATABASE

•	America Online, Inc.	America Online	183-184
050	Delphi Internet Services	Internet Mail Gateway	86
858	NOTIS Systems, Inc.	Graphical User Interface	336

OPERATING SYSTEMS

890	Novell, Inc.	NetWare Connect	NE19-NE21
-----	--------------	-----------------	-----------

OPTICAL PERIPHERALS

018	MegaHaus	Drives/Storage	353
098	Pinnacle Micro	Optical Drives	335

ORGANIZATIONS/SERVICES

•	WordPerfect Corporation	WP Customer Support	18
354	Ziff Davis Magazine Network	Ziff Magazine Network	306-307

PC ACCESSORIES

855	Micro Solutions Computer Products	TapeBackup, CD-ROM, Disk Drives	262
-----	-----------------------------------	---------------------------------	-----

PC DIRECT

025	American Small Business Computers	DesignCAD 2D for Windows	375
235	AMS	Notebooks	378
336	Arlington Computer Products	Mail Order, Peripherals	357-359
325	Austin Direct	Mail Order	367
015	Buildog Computer Products	Mail Order, Hardware, Peripheral	376
300	Computability	Mail Order	318-319
159	COMPUTER DISCOUNT WAREHOUSE	Mail Order	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Mail Order	346-347
•	DEE ONE SYSTEMS	PCs/Hard Drives/Video Cards	379
•	Dell Computer Corporation	Dell Systems	314-315
305	ExpoTech/VTech	486 DX2/50 Mhz, 486 SX/25 Mhz	370-373
014	First Source International	Memory, Software, Peripherals	350-351
089	FOSA Computer Inc.	Portables	334
391/138	H Co Memory Upgrades	Memory, Mail Order	356
219	Insight Direct, Inc.	Mail Order	354-355
027	Insight Direct, Inc.	Mail Order	418
242	Kenosha Computer Center	Mail Order	348
019	L.A. Trade	Memory	374
018	MegaHaus	Drives/Storage	353
010	Midwest Computer Works	Mail Order	352
398	Pinnacle Micro	Systems, Notebooks, Peripherals	321-328
858	NOTIS Systems, Inc.	Graphical User Interface	336
•	PC Connection	Mail Order	331-333
199	PC Zones	Mail Order	342-343
092	PCs Complete	Mail Order	338-339
268	PCs Complete	Mail Order	340-341
024	PerComp Microsystems, Inc.	Mail Order	368-369
098	Publishers Toolbox	Optical Drives	335
375	Publishers Toolbox	Mail Order	337
043	SPSS, Inc.	Statistical & Windows Software	377
081	Sunshine Computers	Notebooks/Laptops	364
357	TC Computers	Mail Order	366
051	USA Flex	Notebooks/Desktops/Peripherals	360-361
210	USA Flex	Notebooks/Desktops/Peripherals	362-363
343	ValueLine	Mail Order, Peripherals	365

PCMCIA

293	3 Com Corporation	Ethernet PCMCIA Adapter Cards	13
934	Adaptec	SCSI Adapter	NE38
014	First Source International	Memory, Software, Peripherals	350-351
391/138	H Co Memory Upgrades	Fax/Modem, Flash, SRAM, Drives	356
106	Kingston Technology	Portable Products	38
916	Photonics	PCMCIA Network Adapters	NE15

PERIPHERAL SHARING DEVICE

•	Hewlett Packard	HP Jet Direct	33
150	SmartPrint/Dresselhaus	SmartPrint	288

PERIPHERALS

159	COMPUTER DISCOUNT WAREHOUSE	Peripherals	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Peripherals	346-347
084	Creative Labs	MUKS	110-111
•	DEE ONE SYSTEMS	Peripherals	379
014	First Source International	Memory, Software, Peripherals	350-351
•	Gateway 2000	Peripherals	49
•	Gateway 2000	Peripherals	48a-1
•	IBM Corporation	Parts & Sales	203
219	Insight Direct, Inc.	Peripherals	354-355
027	Insight Direct, Inc.	Peripherals	418
398	Midwest Micro	Peripherals	321-328
246	Phillips	Magnavox CM4015 15" Monitor	233
375	Publishers Toolbox	Peripherals	337
884	QMS	Magicolor Laser Printer	NE36

POWER PROTECTION

162	American Power Conversion	Power Manager	89
080	PC Power & Cooling	PowerProtection/Cooling Devices	100

PRESENTATION SOFTWARE

011	Corel Corporation	Corel Draw 4	258
•	Microsoft	Microsoft Office	C2-C4p1

PRINTER ACCESSORIES

150	SmartPrint/Dresselhaus	SmartPrint	288
-----	------------------------	------------	-----

PRINTERS

•	Canon Computer Systems	Canon Printers	53
187	Canon, U.S.A.	CJ-10	251

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
300	Computability	Mail Order	318-319
•	Epson America	Epson Stylus Color Printer	10-11
•	Hewlett Packard Peripheral Group	HP LaserJet	96-97
•	Hewlett Packard Peripheral Group	HP Portable DeskJet	186-187
899	QMS	CrownJet Printer	NE7
684	QMS	Magicolor Laser Printer	NE36
001	Tektronix Inc.	Tektronix Phaser Color Printer	24-25
368	Texas Instruments	T1 Printers	244-245
051	USA Flex	Printers	360-361
210	USA Flex	Printers	362-363
PROJECT MANAGEMENT			
148	Primavera Systems	Project Management	45
•	Scitor Corporation	Project Scheduler	63
REMOTE COMPUTING			
920	US Robotics Inc.	Courier Modem	36
RESELLERS			
159	COMPUTER DISCOUNT WAREHOUSE	Reseller	344-345
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	346-347
010	Midwest Computer Works	Reseller	352
SCANNERS			
187	Canon, U.S.A.	CJ-10	251
SERVERS			
087	Acer America	Servers	190-191
•	AST Research	Servers	90-91
308	Compaq Computer Corporation	ProLiant	74-75
•	IBM PC Corporation	MarketViews	170-171
•	Zenith Data Systems	Z-NoteFlex/Multimedia	208-209
SERVICE/SUPPORT			
•	IBM Corporation	Parts & Sales	203
•	WordPerfect Corporation	WP Customer Support	18
SOFTWARE			
025	American Small Business Computers	DesignCAD 2D for Windows	375
287	Borland International	Paradox for Windows	6
300	Computability	Mail Order	318-319
014	First Source International	Memory, Software, Peripherals	350-351
219	Insight Direct, Inc.	Software	354-355
027	Insight Direct, Inc.	Software	418
350	Intergraph Corp.	Microstation	265
•	Microsoft	Microsoft Press	78
•	Microsoft	Microsoft Office	C2-C4,p1
•	Microsoft	Microsoft Access	194-195
199	PC Zones	Mail Order	342-343
148	Primavera Systems	Project Management	45
043	SPSS, Inc.	Statistical & Windows Software	377
373	Visual Software	Visual Reality	156
•	WordPerfect Corporation	Set 1	14-15
•	WordPerfect Corporation	Quattro Pro	16-17
SPREADSHEET/TEMPLATES			
•	Lotus Development Corporation	Lotus 1-2-3 for DOS	76-77
•	Microsoft	Microsoft Office	C2-C4,p1
•	WordPerfect Corporation	Quattro Pro	16-17
STATISTICAL SOFTWARE			
043	SPSS, Inc.	Statistical Software	377
057	StatSoft	Statistical Software	57
TCP/IP			
877	NetManage, Inc.	Chameleon 4.0	NE22
UTILITIES			
033	Inter Systems Inc.	Hack Graphics Suite V.3.0	101
334	Symantec Corporation	Norton Utilities	28
851	Symantec Corporation	Disklock - LAN Campaign	NE16
VIDEO CONFERENCING			
932	Datapoint Corporation	MINX Network Video Systems	NE27
VIDEO GRAPHICS BOARDS			
127	ATI Technologies Inc.	Mach 64-Bit Accelerator	5
300	Computability	Mail Order	318-319
•	DEE ONE SYSTEMS	Video Cards	379
176	Diamond Computer Systems, Inc.	Stealth 64	273
283	Nanaco Corporation	Monitors	43
399	Sigma Designs, Inc.	Video Capture Board	425
WINDOWS SOFTWARE			
025	American Small Business Computers	DesignCAD 2D for Windows	375
075	Computer Associates	CA-Simply Money	420
322	Corel Corporation	Ventura 5	41
358	Intergraph Corp.	Microstation	265
•	Lotus Development Corporation	SmartSuite	173-178
230	Micrograph	Designer	248
•	Microsoft	Microsoft Press	78
•	Microsoft	Microsoft Office	C2-C4,p1
•	Microsoft	Microsoft Access	194-195
058	NOTIS Systems, Inc.	Graphical User Interface	336
375	Publishers Toolbox	Windows Products	337
•	Scitor Corporation	Project Scheduler	63
043	SPSS, Inc.	Windows Software	377
057	StatSoft	Statistical Software	57
334	Symantec Corporation	Norton Utilities	28
373	Visual Software	Visual Reality	156
•	WordPerfect Corporation	Quattro Pro	16-17
WORD PROCESSING SOFTWARE/AIDS			
•	WordPerfect Corporation	Set 1	14-15
WORKSTATIONS			
048	Intergraph Corp.	Personal Workstation	220
•	Zenith Data Systems	Z-NoteFlex/Multimedia	208-209

For Additional Categories See MARKETPLACE PRODUCT INDEX Page 363.



Coming Up

Processor Upgrades

Your PC isn't that old, but it already feels outdated. Or maybe it is that old, but you don't have the budget to buy a replacement. You yearn for a little extra CPU horsepower, and Intel's OverDrive processors or Cyrix's SRx2 and DRx2 upgrades seem to be just the ticket. But will you really get the performance boost you expect? We test a variety of popular CPU upgrades—and also expose the pitfalls of upgrading and tell you how to avoid them.

Business Tools

Professional business tools have evolved rapidly; now they encompass a large group of highly sophisticated and easy-to-use packages. We examine three forecasting and seven business-planning products, covering both DOS- and Windows-based packages in our roundup. In a sidebar, we look at other professional tools for the executive. We also address products for hiring, reviewing, managing, and negotiating with people—and even a few for brainstorming.

Totally Awesome! Really RAD!

Rapid Application Development (RAD) tools for developing SQL front-end applications have never been slicker. The RAD blend of visual interface construction, high-level fourth-generation languages, and object-oriented programming lets you turn out sophisticated GUI applications in record time. We test eight leading tools for Microsoft Windows and OS/2 and preview important upcoming releases.

Network Management

Managing your network is like trying to hit a moving target. More and more PCs, servers, printers, and other devices make it increasingly complex and potentially chaotic. To keep your users happy—and to keep your business in business—you need a variety of functional, integrated software management tools to track the status of your LAN and alert you when things are about to go wrong. We look at suites of network management tools—for their installation, functionality, integration, and ease of use.

Fractal Image Compression

Of all the images a computer can create, few can rival fractals for sheer beauty. But fractals also have one very real—and very useful—application: They can be used to compress large bitmap images to a fraction of their normal size. Explore this technology in the next Tutor column.

Editorial Product Index

Reader Service

No.	Product	Company	Page
436	Accent 1.0	Accent Software International	42
486	Aegis: Guardian of the Fleet	Time Warner Interactive	422
480	Ami Pro for Windows, Version 3.1	Lotus Development Corp.	162
466	Anvil-1000MD for Windows, Version 2.00	Interactive Design Consultants	223
404	ArtiSave Backup	Artisoft Inc.	61
963	AT&T Vistium Personal Video System 1300	AT&T Global Information Systems	NE8
418	Audiotrix Pro	Mediatix Peripherals Inc.	46
467	AutoCAD Release 12 for Windows	Autodesk Inc.	227
468	Cadvantage for Windows, Version 6	Isicad Inc.	232
427	Canon BJC-4000 Bubble Jet Color Printer	Canon Computer Systems Inc.	37
412	Checkmark Payroll for Windows 1.0	Checkmark Software Inc.	54
413	City Streets for Windows	Road Scholar Software Inc.	56
955	Communique Control Server (CS)	CommVision Corp.	NE33
955	Communique Remote Control Server (RCS)	CommVision Corp.	NE33
444	Compro Multimedia Upgrade Kit	ACS/KRIS Technologies Inc.	135
416	Crosstalk with Crossfax for Windows	Digital Communications Associates	48
469	DesignCAD 2D for Windows, Version 7.0	American Small Business Computers Inc.	234
483	Detroit	Impressions Software	419
951	Distributed Enterprise Management Architecture (DeMarc)	Banyan Systems Inc.	NE33
470	Drafix CAD Professional for Windows, Version 3.0	Foresight Resources Corp.	236
471	Drawbase for Windows Model 4000, Version 1.2	CADworks Inc.	237
449	DSP-16 Sound System	MediaMagic	138
472	DynaDesigner for Windows	Ditek International	246
426	Epson Stylus Color	Epson America Inc.	37
458	Everyware 160	Combinet Inc.	274
458	Everyware 400	Combinet Inc.	274
408	Explorer Deluxe	Aztech Labs Inc.	66
441	ForeHelp, Version 1.0	Fore Front Inc.	299
452	4PLex Sound Chaser	Plextor	152
446	Game Blaster CD 16	Creative Labs Inc.	136
423	Gamma UniType 1.5	Gamma Productions Inc.	42
484	Gettysburg	SWFTE International	419
na	GroupWise	WordPerfect, The Novell Applications Group	207
414	HiJaak Graphics Suite, Version 3.0 for Windows	Inset	71
429	HP DeskJet 540	Hewlett-Packard Co.	37
953	HyperSwitch A100	Cisco Systems Inc.	NE37
447	Identity IDCDKIT1	Identity Systems Technology Inc.	138
na	InfoCentral for Windows	WordPerfect, The Novell Applications Group	210
965	Intel ProShare Personal Conferencing Video System 200	Intel Corp.	NE13
434	Intel Smart Video Recorder Pro	Intel Corp.	52
966	InVision, Version 3.0	InVision Systems Corp.	NE14
954	ISDN support for the Cisco 4000, 04500, and 700	Cisco Systems Inc.	NE33
403	Jack of Diamonds	Ositech Communications Inc.	61
463	Kermit Learns How Computers Work	Prima Publishing	73
464	Kermit Learns Windows	Prima Publishing	73
461	LANLine 5240I	Gandalf Technologies Inc.	287
435	LegalPoint	Teneron Corp.	52
428	Lexmark ExecJet IIc	Lexmark International Inc.	37
460	Long Distance LAN Adapter E	Extension Technology Corp.	282
460	Long Distance LAN Adapter E-201	Extension Technology Corp.	282
480	Lotus 1-2-3 for Windows, Release 5.0	Lotus Development Corp.	182
480	Lotus Approach for Windows, Release 3.0	Lotus Development Corp.	196
na	Lotus Organizer	Lotus Development Corp.	210
480	Lotus SmartSuite 3.0 for Windows	Lotus Development Corp.	211
450	Megamedia SS20	Megamedia Computer Corp.	151
421	MGA Impression Plus	Matrox Graphics Inc.	44
473	MicroGDS, Version 3.2	Graphics Data Systems Corp.	249
481	Microsoft Access, Version 2.0	Microsoft Corp.	201
489	Microsoft Complete Baseball	Microsoft Corp.	421

481	Microsoft Excel, Version 5.0	Microsoft Corp.	185
na	Microsoft Mail for PC Networks	Microsoft Corp.	207
465	Microsoft Multimedia Viewer How-To CD	The Waite Group	73
481	Microsoft Office Professional, Version 4.3	Microsoft Corp.	216
481	Microsoft Word for Windows, Version 6.0a	Microsoft Corp.	168
474	MicroStation for Windows NT, Version 5	Intergraph Corp.	252
474	MicroStation PC, Version 5	Intergraph Corp.	252
488	Millennium Auction	Eidolon Inc.	424
433	Money Maker for Windows	Q-West Associates	37
456	MultiSound Monterey Multimedia Upgrade Kit	Turtle Beach Systems	157
962	Netwave Access Point	Xircom Inc.	NE17
962	Netwave CreditCard Adapter	Xircom Inc.	NE17
420	Network Central	First Floor Inc.	47
409	One Click Manager	Austinsoft Corp.	66
482	Paradox 5.0 for Windows, Workgroup Edition	WordPerfect, The Novell Applications Group	202
459	PC IMAC	DigiBoard	275
459	PC IMAC/4	DigiBoard	275
482	PerfectOffice 3.0 for Windows	WordPerfect, The Novell Applications Group	218
964	Person to Person for OS/2 and Windows 1.0.3	IBM Corp.	NE8
406	Personal Archiver	Chili Pepper Software	62
411	Phonetic Engine 500 Speech Recognition System	Speech Systems Inc.	71
457	Pipeline 50	Ascend Communications Inc.	274
475	P2 CAD System, Version 3.1	CadWare srl	254
448	Premium Deluxe Multimedia Kit	Media Vision Inc.	146
453	Quantum	Reveal Computer Products	152
482	Quattro Pro 5.0 for Windows, Workgroup Edition	WordPerfect, The Novell Applications Group	188
405	QuickXpense for Windows	Portable Software Corp.	62
402	Radio Rock-It RDS	Advanced Digital Systems	61
454	ReelMagic CD-ROM Upgrade Kit	Sigma Designs Inc.	154
462	Remote Express ISDN LAN Adapter	Intel Corp.	288
462	Remote Express ISDN Bridge Pack	Intel Corp.	288
431	Reuters Money Network	Reality Online Inc.	37
422	Simon	Bell South Cellular Corp.	46
410	SmartLook	STS Systems Inc.	66
415	Software Audio Workshop Version 3.0	Innovative Quality Software	71
446	Sound Blaster Digital Edge 3X	Creative Labs Inc.	136
446	Sound Blaster Edutainment CD 16	Creative Labs Inc.	136
445	Sound Galaxy Voyager	Aztech Labs Inc.	135
960	StreetMeter, Version 3.0	Trellis Software Inc.	NE18
448	Super Deluxe Multimedia Kit	Media Vision Inc.	146
424	SuperPrint 3.1	Zenographics Inc.	50
407	TeleCamera	Howard Enterprises Inc.	62
417	Telx for Windows 1.0	deltaComm Development	48
430	TI microMarc Color	Texas Instruments Inc.	37
455	Toptek Multimedia Advanced Upgrade Kit	Toptek Technology Inc.	154
485	Train Engineer	Abracadabra	421
959	Tribelink	Tribe Computer Works	NE37
476	TrueCAD for Windows, Version 2.10c	Choice Computing	255
477	TurboCAD for Windows, Version 2.01 Version 2.1	IMSI	259
478	Ultimate CAD for Windows Base	Automated Methods Inc.	261
479	Vellum, Version 2.12	Ashlar Inc.	263
956	VFX/40	Dialogic Corp.	NE37
487	Video Jam	EA Kids	424
451	Vienna	Ocean Information Systems Inc.	151
425	Visio 3.0	Shapeware Corp.	50
401	Wacom ArtPad	Wacom Technology Corp.	61
432	Windows on Wall Street 2.1	MarketArts Inc.	37
961	WinInstall, Version 4.0	OnDemand Software and Services Inc.	NE22
482	WordPerfect 6.0a for Windows	WordPerfect, The Novell Applications Group	172

NE—Network Edition

To obtain the Network Edition of PC Magazine call Circulation at 800-289-0429

20,000 PRODUCTS 24 HOURS A DAY.

PCI SYSTEM

Pentium™ 60MHz PCI System for only

\$1,699

Intel 60MHz Pentium
64-bit Processor
273 pin ZIF socket
PCI Interface
2 PCI slots, 1 PCMCIA slot,
4 ISA slots
8MB RAM, 256K cache
420MB HDD
PCI local bus video
14" N.I. SVGA color
1.44MB 3.5" floppy
2 serial, 1 parallel port
101 key bkd., mouse
MS-DOS 6.22, Win. for
Workgroups 3.11
Desktop case std.,
Ultimate Tower avail.

NETWORKING

3Com

Etherlink III BNC 3C509 \$115
Etherlink III BNC Spk 3C509 499
Etherlink III BNC 20pk 3C509CO 1,949
Etherlink III TP 3C509TP 119
Tokenlink III 3C619 479

ARTISOFT

Lanlastic 6.0 1 user 3.5" \$69
Lanlastic 6.0 St Kit BNC (2) Noderunner/SI 2000C 349
Lanlastic 6.0 Add on BNC/oderunner/SI 2000C 159
Lanlastic 6.0 Add on TP Noderunner/SI 2000T 159
Lanlastic 6.0 5 user 3.5" 349

SMC

Ethernet+ Elite 16T \$110
Ethernet+ Elite 16T 6 Pack 129

TI-MAGNETIC

TC-4045 16/4 Token Ring \$349

Intel

Intel Ether Express 16 \$99
Intel Ether Express 16TP 105
Intel Ether Express FlashC 129

Xircor

PE3-10B2 Pocket Ethernet BNC \$269
PE3-10B2 Pocket Ethernet combo 299
PE3-10B2 Pocket Ethernet TP 269
PPX-03 Parallel Port Multiplexor 89
PT02-16B7 Token Ring 16/4 RJ-11 549

SOFTWARE

The lowest prices on thousands of titles.

Novell Netware V 4.01*

Netware 4.02 5 user CD 214830 \$769
Netware 4.02 10 user CD SWRDCNV41 1,749
Netware 4.02 25 user CD 214831 2,599
Netware 4.02 50 user CD 214833 3,449
Netware 3.12 5 user SWRDCNV32 599
Netware 3.12 10 user SWRDCNV31 1,349

MEMORY

Kingston

Your source for all Kingston products.

PCMCIA CARDS

AT&T

AT&T Faxmodem 14.4/14.4 cellular \$299

Megahertz

14.4/14.4 PCMCIA Faxmodem XJack send/rec \$219
96/24 PCMCIA Faxmodem XJack send/rec 95
96/96 PCMCIA Faxmodem XJack send/rec 189
14.4/14.4 PCMCIA Gold Series Faxmodem send/rec 209

Hayes

Optima 14.4/14.4 PCMCIA Faxmodem \$265

Xircor

Network combo \$259
Network RJ-45 319
Network BNC 219

Robotics

Worldport 14.4/14.4 PCMCIA Faxmodem \$195

MODEMS

Hayes

Optima 14.4/14.4 External Faxmodem \$379
Optima 96/96 External Faxmodem 355
Ultra 96 External Modem 559
Optima 24 External Faxmodem 109
Accura 24 External Modem 75

Practical Peripherals

Proclass 14.4/14.4 Internal Faxmodem \$139
Proclass 14.4/14.4 External Faxmodem 149
Proclass 28.8/14.4 Internal Faxmodem 259
Proclass 28.8/14.4 External Faxmodem 369
Series II 14.4/14.4 Internal Faxmodem 105
Series II 14.4/14.4 External Faxmodem 119

Robotics

Sportstar 14.4/14.4 Internal Modem \$115
Sportstar 14.4/14.4 Ext. Faxmodem 119
Sportstar 28.8/28.8 Ext. Faxmodem 245
Sportstar 28.8/28.8 Int. Faxmodem 225

MONITORS



15", 1280 x 1024, NI CMMX15F-1

\$339

15" MAG CMMX15F \$499
17" MAG CMMX17 659
17" MAG CMMX17F 939
21" MAG CMMX21F 1,789

14" MultiSync SVGA CMNEC14 \$295
14" MultiSync 2V CMNEC2V 329
15" MultiSync 3V CMNEC3V 459
15" MultiSync 5FGE CMNEC5FGE 979
21" MultiSync 6FGE CMNEC6FGE 1,979

CD-ROM DRIVES

TEAC

CD55 Superquad 4x CD-ROM w/controller \$429

NEC

3xi Internal Bare \$429 w/controller \$499
3xe External Bare \$459 w/controller \$529
4x External Bare \$899

Plextor

Model DM-3028 \$259 w/controller \$289
External bare 369 w/controller 399
4-Plex Internal 475 16-bit Kit 549

Toshiba

Model 3401 Bare \$269 w/controller \$359

CREATIVE

Sound Blaster Pro Deluxe \$79
Sound Blaster MIDI Kit 135
Sound Blaster 16CD ASP 179
Sound Blaster 16 SCSI 179
Sound Blaster Deluxe 59
Sound Blaster 16 SCSI ASP 219
Sound Blaster Pro Deluxe 8 Bit 79
Video Support for Windows \$299
Video Blaster 249
Wave Blaster Board 189

REVEAL

MultimediaFX-02 - Int. drive double speed, 300KB transfer, 16 Bit sound, speakers, microphone and 8 titles \$299
MultimediaFX-08 - Int. drive double speed, 300KB transfer, 16 Bit sound, speakers, microphone and 35 titles \$539

REMOVABLE STORAGE

Fujitsu

Fujitsu Int. MO 230MB (PC) \$999
Fujitsu Dynamo 230 (Mac or PC) 999
Bernoulli 90 Pro Internal Kit 369

Bernoulli Multidisk Insider 150 IDE

210MB Kit BEMD210K \$399
505MB Kit BEMD505K 599
1050MB Kit BEMD1050K 799

NOTEBOOK COMPUTERS

E-Series

200MB HD X2/250 Dual Scan Color \$2,349
200MB HD X2/250 Active Color 2,849
340MB HD X4/75 Active Color 3,549
455MB HD X4/75 Active Color 4,435
4000E Intelligent Docking Station 779

M-Series Multimedia

120MB HD SX/25 Passive Color \$2,099
200MB HD SX/25 Active Color 2,329
200MB HD SX2/50 Dual Scan Color 2,759
340MB HD X2/50 Active Color 3,349
340MB HD X4/75 Active Color 4,899
455MB HD X4/75 Dual Scan Color 4,439
Portable CD-ROM Docking Station 779

TOSHIBA

TI1910 486SX/33 \$1,459
200MB 9.5" Monochrome 4MB RAM 1,999
200MB 9.5" Dual Scan Color 4MB RAM 1,999

T1960 486DX/50

200MB 9.5" Dual Scan Color 4MB RAM \$2,399
200MB 8.4" Active Color 4MB RAM 2,999
320MB 8.4" Active Color 4MB RAM 3,279

T2400 486DX/50

250MB 9.5" Dual Scan Color 4MB RAM \$2,949
320MB 8.4" Active Color 8MB RAM 3,669
320MB 8.4" Active Color 8MB RAM 3,839

T3400 Portage 486DX/50

120MB 7.8" Active Color 4MB RAM \$2,379
250MB 7.8" Active Color 4MB RAM 2,869

T3600 486DX/50

250MB 8.4" Active Color 8MB RAM \$3,999

T4700 486DX/50

320MB 9.5" Active Color \$4,799
200MB 9.5" Active Color 4,579

PRINTERS



MicroLaser Pro 800 PS23

\$1,199

MicroWriter LED Spdm 512K 469
MicroWriter PS23 LED Spdm 2MB 619
MicroWriter PS65 LED Spdm 2MB 799
MicroLaser Pro 800 PS65 1,529
MicroLaser Power Pro 12ppm 1,829
MicroLaser color 379

Canon

BJ-10SX Portable Bubble Jet \$249
BJ-200E Bubble Jet 289
BJ-230 Wide Carriage Bubble Jet 399
BJC-600 Color 589
Laser LBP 430 589
Laser LBP 860 1,149

EPSON

LQ-570+ 24 pin Dot Matrix \$249
DFX 5000+ High Speed 1,359
Stylus 800 Inkjet 259
Stylus 1000 Inkjet 449
Action Printer 3250 Dot Matrix 189
Stylus Color Inkjet 720 dpi 579
Action 1800 6 ppm Laser 979

NEC

P6200 24 Pin \$409
P6300 24 Pin 629
Silentwriter 1097 1,429
Silentwriter 610 479

OKidata

OL410E Laser \$519
OL810 Laser 929
OL850 Laser 1,239
ML380 Dot Matrix 219

HEWLETT PACKARD

LaserJet 4L 4 ppm Laser \$599*

LaserJet 4P 600 DPI Laser 965
DeskJet 310 Portable Ink Jet 289
DeskJet 520 Ink Jet 279
DeskJet 560C Ink Jet color 539
DeskJet 1200C 1,425
DeskJet 1200PS 2,069
*After \$50 mail-in rebate

TAPE BACKUPS

COLORADO MEMORY SYSTEMS

250MB Internal Tape Backup \$169
120MB Internal Tape Backup 99
Trakker 250MB External Parallel 329
Trakker 120MB External Parallel 219

CONNER

TapeStor 250MB Internal Tape Backup \$149
TapeStor 250MB External Parallel 339

EXABYTE

8mm 5.0Gig Model 850S \$2,199
8mm 2.2Gig Model 820S 1,299
8mm Tape Cartridge 12

MEGA

omega Tape250 Internal Basic \$159
omega Tape250 Insider Half-height 169
omega Tape250 PC Powered Ext. 269

Talon 250MB Internal

w/2 unformatted tapes TBT250IK \$169
w/5 formatted tapes TBT250IKS 199
Parallel Port TBTAT20 299

WangDAT.

4mm DAT 2GB Int. 16 Bit Kit \$699
4mm DAT 4GB 3200 Int. 16 Bit Kit 1,049
4mm DAT 4GB 3200 Ext. 16 Bit Kit 1,199
4mm DAT 8GB 3400 Int. 16 Bit Kit 1,299

UPS

Backup-UPS 280 \$99
Backup-UPS 400 169
Backup-UPS 600 259
Backup-UPS 900 369
Backup-UPS 1250 499
Professional SurgeArrest w/Telephone 39
Network SurgeArrest w/Telephone 49

BC250 \$59
BC400 159
BC500LAN 199
BC750LAN 309
BC 900LAN 359

HARD DRIVES

From the Mass Storage Experts



Capacity Interface Model Access FF/Height Bars

WESTERN DIGITAL

200MB IDE WDAL2200 12ms 2.5" \$259
210MB IDE WD1210A 12ms 3.5" 179
270MB IDE WD1270A 12ms 3.5" 199
340MB IDE WD2340A 12ms 3.5" 209
420MB IDE WD2420A 12ms 3.5" 219
540MB IDE WD2540A 12ms 3.5" 279
730MB IDE WD2700A 12ms 3.5" 379
1080MB IDE WD31000A 10ms 3.5" 499

CONNER

213MB IDE CFS210A 14ms 3.5" \$189
340MB SCSI CFA340S 13ms 3.5" 259
426MB IDE CFA3420A 14ms 3.5" 239
540MB IDE/SCSI CFA340AS 10ms 3.5" 299/309
1080MB IDE/SCSI CFI1080AS 9.5ms 3.5" 549/609

FUJITSU

1080MB SCSI FJ2684S 10ms 3.5" \$609

Maxtor

290MB IDE/SCSI MX7290AS 15ms 3.5" \$219/229
340MB IDE MX7345A 12ms 3.5" 219
340MB SCSI MX7345S 12ms 3.5" 249
545MB SCSI MX7546S 12ms 3.5" 319

MICROPOLIS

150MB IDE/SCSI MC4110AS 8.5ms 3.5" \$599/609
1050MB SCSI MC2210AV 10ms 3.5" 739
1626MB IDE MC2217A 10ms 3.5" 899
1690MB SCSI MC2217AV 10ms 3.5" 999
1750MB SCSI MC7450S 12ms 3.5" 899
3000MB SCSI MC1936 11ms 5.25" 1,899
3000MB SCSI MC1936AV 11ms 5.25" 1,899
9100MB SCSI MC1991 10ms 5.25" 3,599

Quantum

210MB IDE QULP510A 15ms 3.5" \$119
270MB IDE QULP520A 12ms 3.5" 209
270MB IDE QULP520S 12ms 3.5" 229
340MB IDE QULP530A 12ms 3.5" 239
340MB SCSI QULP540A 12ms 3.5" 309
540MB SCSI QULP540S 12ms 3.5" 399
1080MB SCSI QUEM1080S 9ms 3.5" 699
1440MB SCSI QUEM1400S 9ms 3.5" 849
2100MB SCSI QUEM2100S 9.5ms 3.5" 1,129

Seagate

130MB IDE ST3145A 15ms 3.5" \$169
210MB IDE ST3234A 14ms 3.5" 179
260MB IDE ST3290A 18ms 3.5" 189
340MB SCSI ST3380N 11ms 3.5" 245
340MB IDE ST3391A 12ms 3.5" 209
420MB IDE ST3481A 14ms 3.5" 219
545MB IDE/SCSI ST5680AN 12ms 3.5" 279/299
722MB IDE ST3730A 12ms 3.5" 379
1050MB SCSI ST31200N 9.5ms 3.5" 1,199
1083MB IDE ST31220A 12ms 3.5" 1,199
1700MB SCSI ST11952N 8ms 3.5" 1,499
1700MB SCSI ST11900N 8ms 3.5" 1,079
2100MB SCSI ST12400N 10.5ms 3.5" 1,979
2145MB SCSI ST12550N 8ms 3.5" 1,299
4294MB SCSI ST15150N 8ms 3.5" 2,059
4294MB SCSI ST15232N 8ms 3.5" 1,899
9080MB SCSI ST410800N 11ms 5.25" 3,499

"SIMPLY THE LOWEST PRICES"

FREE Insight Catalog.

The Insight catalog is your Super Direct source for computers, hardware and software.

Insight

Your Direct Source

800-535-1542

Prices and specs subject to change without notice. Warranty-Free Guarantee and 1-year warranty. All trademarks are the property of their respective owners. All prices are subject to change. Product may not be available in all areas. © Insight Direct, Inc. 1/94

CIRCLE 027 ON READER SERVICE CARD

After Hours

EDITOR'S RATINGS: ★ Poor ★★ Fair ★★★ Good ★★★★ Excellent

CD-ROM

Windows

CD-ROM

Resource-Intensive

Adult Content

Kids (Ages)

Price

Almost as Good as the Real Thing: Simulation Software

For everyone who thinks of simulations as flying, shooting, or killing games, there's someone else who thinks of them as exercises in world building and management. They're both right. What sets simulations apart are their attempts to create realistic scenarios of some type. Think of simulations, then, as just like the real thing—only better.

Two of the simulations here, *Detroit* and *Train Engineer*, fall into the realm of enterprise or industry creation and management. A third, *Gettysburg*, is a historical recreation of the famed Civil War battle. All three share an attention to detail you won't find in any other type of game.

Detroit

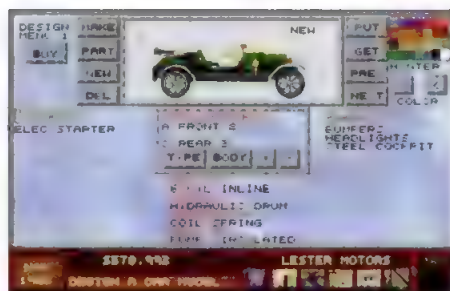
Impressions Software;
617-225-0500.

Circle 483 on reader service card

★★★★ CD \$69.95

Do you have what it takes to become another Henry Ford? Or will your crowning glory be a repeat of the Edsel? *Detroit* lets you chart your own rise or fall in the world of auto manufacturing.

You start in 1908 with a single factory, one sales office, and \$60,000 in capital funds—a sizable fortune for the time. Your goal is to build and market a line of automobiles that will sell throughout the world. You have 100 years to accom-



With *Detroit*, you get to test your auto design and marketing skills.

plish this, and some tough computer-driven competition standing in your way.

Your initial bankroll dwindles quickly when you consider all the costs. There are salaries and benefits for hundreds of assembly-line workers

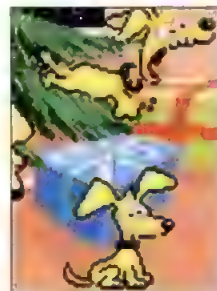
and technicians; research and development in any of seven areas; exhaustive road tests; targeted and well-placed advertising; and expansion to contend with. You monitor your progress through reports. You'll get P&L statements,

demand analyses, comparisons with the competition, and breakouts by territory, model, and sales office.

Detroit's interface is good; you can choose different actions from the icon bar below the main screen, or by selecting various hot spots on the screen itself. The graphics, however, are merely adequate. The car design screen, which offers a choice of parts you can combine and repaint to customize your models, is the most attrac-

tive. However, Impressions Software missed an opportunity to personalize their product further when they concentrated on VGA images of offices and factories. There isn't a face in sight.

Detroit misses some of the excitement in Impressions' earlier simulation, *Airbucks*, with its cutthroat competition for air routes. But taken on its own terms, this is a good strategy-based game. With a large world to conquer and no two games alike, you'll challenge its odds again and again. —Barry Brenesal



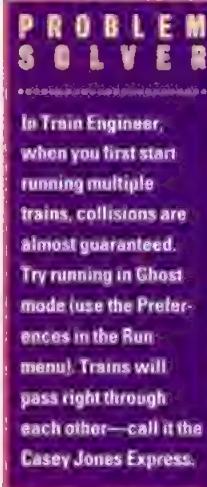
Gettysburg Multimedia Battle Simulation

SWFTE International Ltd.;
800-237-9383, 302-234-1740.

Circle 484 on reader service card

★★★★ CD \$69.95

The Civil War ended over 100 years ago, but for many it retains a unique fascination. With the *Gettysburg Multimedia Battle Simulation*, co-produced by SWFTE International and Turner Home Entertainment, Civil War buffs can recreate the bloody three-day battle that proved to be a turning point of the war, and armchair generals can take command of



AFTER HOURS INDEX

Simulation Software

Detroit.....419

Gettysburg Multimedia Battle

Simulation.....419

Train Engineer.....421

CD-ROM Pick Hit

Microsoft Complete

Baseball.....421

Battle Simulations

Aegis: Guardian of the Fleet...422

Quick Clips

Jets!.....424

MegaDittos.....424

The Greatest Paper

Airplanes.....424

VideoHound Multimedia.....424

Multimedia

Video Jam.....424

Spotlight On Art

Millennium Auction.....424

Personal finance software for people who don't know their assets from their elbows.

Kiplinger's Simply Money 2.0 Covers Simply Everything:

- Advice from Kiplinger
- CheckFree® Bill Payment
- Financial Calculators
- Direct Import of Quicken Files
- Checking and Savings Accounts
- Investment Tracking
- Tax Reports
- Automatic Budgeting
- Computerized Check Writing
- Credit Cards
- IRAs/401(k)s
- Modern Stock Updates
- Mortgages
- Memorized Transactions

instead of a painful one. Join them and you can pay bills electronically or print checks. Either way, your account will be balanced, automatically.



Intuitive menu icons make it quick and easy.

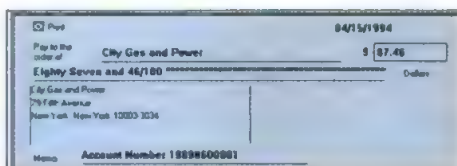
your savings account, credit cards, mortgage, loans, investments, payroll and tax-free accounts, assets, liabilities, even your spare cash.

If managing your personal finances is a job you just can't seem to manage, help is now available — in a bright yellow box.

It's called

Kiplinger's™

Simply Money™ and more than 1,000,000 people rely on it to make managing money a simple task



Choose to print checks, or make payments electronically.

Kiplinger's Simply Money is that simple. Yet it's also the most advanced personal financial software available. It keeps track of

And why not let Kiplinger's Financial Advisor plan your future. For over 70 years Kiplinger has helped millions of Americans



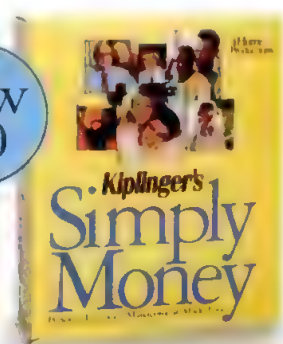
with their personal finances. And now there's 300% more financial advice included. You'll also find 63 reports and graphs to help plan your



retirement, monitor spending patterns, update your portfolio and actually save money.

You can also calculate how much to set aside for life insurance and college. And determine annual yields from stock dividends. Kiplinger's Simply Money is, quite simply, the best financial software for your money.

Once you try it, you'll never mistake anything for your elbow again.



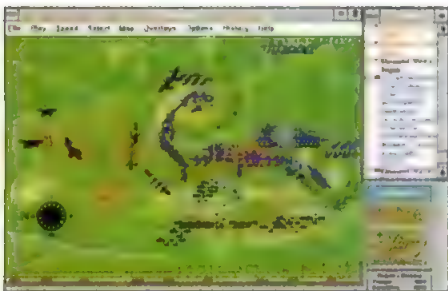
Stop by any software dealer or call 1-800-773-5445, dept. BE040 for the one nearest you.

4Home Productions™

either side and attempt to change the battle's outcome.

Before you take sabre in hand, be sure to view the simulation in historical mode. Icons on the map represent brigades of cavalry, infantry, and artillery, and combat occurs both audibly and visibly. At any time, you can left-click on a troop icon to identify the commanding officer and check health and strength statistics, or right-click for more detailed information and a short video clip from Turner's movie *Gettysburg*.

Critical points in the battle simulation are narrated by Civil War historian Shelby Foote, and several short documentary videos provide background on the terrain, weapons, and strategic situation. Also included are readings of Lincoln's Gettysburg Address and Lee's Farewell Address. Do note that SWFTE had to take a few liberties with the timing of events on



The Field Notes window in *Gettysburg* explains what's happened in various stages of battle.

the second and third days, to spread out the action over a manageable period of time.

In interactive mode, simulated troops carry out your general orders. For example, they can entrench and defend their position, or seek the enemy at long range. Brigades come into play as they did historically, and you deploy them by dragging with the mouse. Move one or several brigades at the same time, or order a group to converge on one point. You can

even specify a twisting path that takes advantage of the terrain.

The interactive simulation is not a war game as such; rather, it lets you experiment with possibilities. What if Pickett had refused to charge, for example? If you never heard of Pickett's charge, if you don't know Cemetery Hill from Seminary Ridge, this isn't the package for you. But if you know which side Colonel

Krzyzanowski was on, you'll love it! —Neil J. Rubenking

Train Engineer

Abracadata; 800-451-4871.

Circle 485 on reader service card

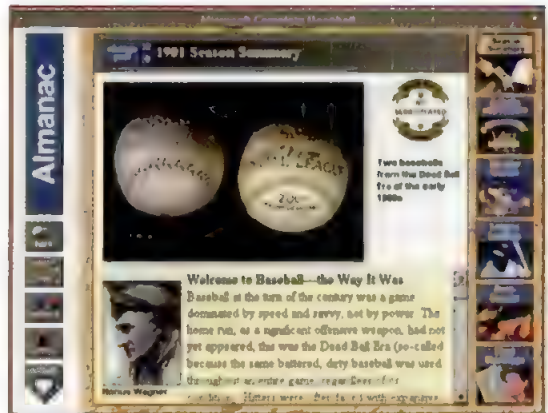
★ C-2 WIN \$49.95

Model railroaders don't need any help with multimedia simulations; they're working with the real thing. For the rest of us who want to climb aboard that iron horse, there's *Train Engineer*.

Microsoft Complete Baseball

Major league baseball players may have gone out on strike, but that doesn't mean the season has to end, thanks to this multimedia reference devoted to America's favorite pastime. The disk includes a comprehensive history of the game, where you can learn everything from when the first hot dog was sold at a ballpark to who founded the Negro National League. In addition, there are player biographies, team information, and an almanac, as well as audio clips, color images, and action videos. There's no search engine, though, so you may have to hunt around for that Pete Rose video.

For the fantasy league aficionados, there's the option to subscribe to *Microsoft Baseball Daily* (\$1.25 per issue), a baseball newspaper of up-to-date stats and news, delivered via modem even during the strike. There's enough baseball information here to almost make you forget



the abbreviated season.

—Gayle C. Ehrenman

Microsoft Corp.; 800-426-9400, 206-882-8000.

Circle 489 on reader service card

★★★★ WIN \$79.95

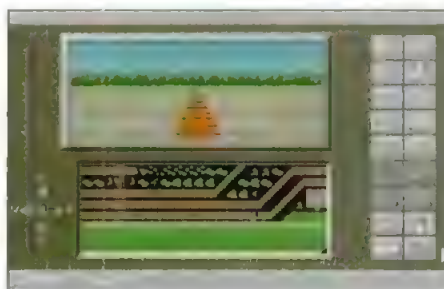
Part layout design, part driving simulation, this program continues what *Abracadata* started with *Design Your Own Railroad*. The design module here includes tracks, tunnels, industries, bridges, and a selection of landscape items. You select these objects from an edit window, then place them in your layout. Unfortunately, these tools suffer from poor graphics that lag behind what can be found in comparable simulations, such as Maxis' *A-Train*. Blocky icons are difficult, if not impossible, to identify. A big gray square might be an oil refinery or a warehouse; your guess is as good as anyone's.

After you create a layout

and set up a schedule of pickups and deliveries, step into the cab. You can place as many as eight trains in your layout and switch among them as they move through their route. If you're a poor engineer, you may suffer a collision or derailment, which elicits a short video clip of the ensuing carnage.

The viewing screen doesn't provide enough information for you to really enjoy the feel of driving a train. You can zoom the overhead view to full screen, which will display the names of buildings as you approach them. The only problem is that your trains stop moving when you switch to this screen.

Running an efficient and



Drive carefully or you'll derail one of eight trains under your control in *Train Engineer*.

well-designed railroad that you build yourself is enough to get you humming "Rock Island Line." But *Train Engineer*, despite the concept, manages only a long, lonesome wail. —Peter Scisco

After Hours

Battle Simulations Realistic Combat on the High Seas

Aegis: Guardian of the Fleet

Time Warner Interactive;
800-482-3766.

Circle 486 on reader service card

★★★★★     \$69.95

If you always wanted to command a Navy warship, here's your chance. Aegis: Guardian of the Fleet is an astonishingly accurate simulation of the Ticonderoga-class guided-missile cruiser. This cruiser responds to air, surface, and sub-surface threats, so there's always plenty of action.

Aegis isn't a simulation that

you can load and begin playing; you have to study the manual to learn what the symbols on the radar mean and what the proper sequence is for locking and firing a missile. You'll need to come up to speed on terminology, sensors, and weapons. The latter range from five-inch guns to Tomahawk, Harpoon, and ASROC missiles.

Your next stop is the Command Information Center (CIC), the heart of the game. From here you can control the weapons, passive and active sonar, radar, and countermeasure defenses, as well as communications with the bridge. The layout and design of these controls is startlingly realistic, as the game's devel-



The graphics in Aegis are as realistic as national security and computer animation will allow.

opers worked from photos of a real Aegis cruiser. A few pieces of equipment have been omitted, however, because of national security concerns. But don't worry, you won't miss them. The graphics, sound, animation, and live-action video of missile launches are so engaging

you'll start feeling seasick.

Of course, your goal here is to engage the enemy in military actions. There are three skill levels, so you can ease yourself into full command. Mission choices in Aegis range from 18 training cruises to actual historical battles like the Libya/Tripoli incident in 1986, the

Persian Gulf conflict in 1987-1988, Operation Desert Shield in 1990-1991, and Operation Desert Storm in 1991. Some fictional battles were included to bring the total to 100 missions.

If naval warfare is your thing, Aegis is your game.

—Donald B. Trivette



Annual
Newsstand
Price

~~\$86.40~~



Regular
Subscription
Price

~~\$49.97~~



Special
One-Year
Price

CALL NOW
FOR YOUR
LOWEST
RATE



SUBSCRIPTION SALE

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all
from PC MAGAZINE.

To receive your lowest possible rate,
call toll-free:

1-800-289-0429

BONUS:

Free Home or Office Delivery

Please mention code 4294 to our operator.



Comdex is coming, and so is the hottest event of the year. It's the 6th Annual Micrografx Chili For Children Cook-Off.

6 pm, Tuesday, Nov. 15th

at the Thomas & Mack

Center in Las Vegas (U.N.L.V.).

Sample the best chili recipes

this side of the Rio

Grande, prepared

by some of the biggest names in

the computer industry. Then as a

special treat, catch WILLIE NELSON

performing live in concert.

MICROGRAFX
CHILI FOR
CHILDREN



A RECIPE FOR HOPE

And the evening wouldn't be complete without the amazing you've-got-to-see-'em-to-believe-'em armadillo races.

You'll also be helping out a great cause—the

National Center For Missing & Exploited Children. Which is the

best reason of all to attend. Get your

\$50 tickets in the lobby of the Convention Center or the Sands Expo.

Three Great Reasons

To Attend The

Sixth Annual

Micrografx Chili For Children

Cook-Off.



OR CALL
1-800-357-7255

MICROGRAFX®

IDG
INTERNATIONAL DATA GROUP

INGRAM
MICRO

Intuit®

Microsoft®

ZD Ziff-Davis Publishing

IBM®

Inc.
MAGAZINE

intel

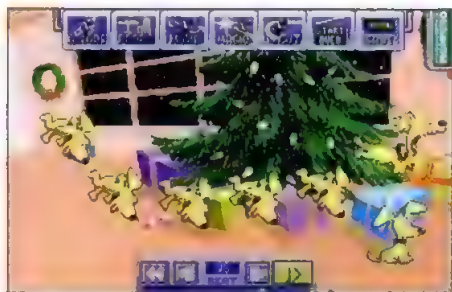
THE
INTERFACE
GROUP

Lotus
Working Together

PICTURETEL

TEXAS
INSTRUMENTS

After Hours



Video Jam's studio is where you manipulate actors and props to create your own video.

Multimedia We're Jamming

Video Jam

EA*Kids (Electronic Arts);
800-245-4525.

Circle 487 on reader service card

★★★ C>  \$49.95

If you like to roll your own—and I mean Rock and Roll your own—then Video Jam is for you. This multimedia music package lets kids be both producer and director as they create their own music videos.

Video Jam's easy to use; it provides a demo that teaches you the basics features of the program. When you're ready to start production, go to your Office, where you choose the music you want from the more than 50 songs offered in the Jukebox, which range from Rock to Rap to Classical, and more; then, you choose a background scene (perhaps a country scene or a cityscape or even a moonscape); and finally, you audition a cadre of actors and

choose your favorites.

When you're ready to start taping, it's time to move to the Studio, where you'll put it all together. Here you deal with timing as well as choosing when the actors appear and what they'll

do. For instance, you can have on actor glide while another spins. If an actor doesn't make the grade, simply replace him with another.

When you're satisfied with your Video Jam production, you can save your movie to the Film Library. Want to show your creation to a friend? Video Jam lets you make a copy on a floppy disk, which you can play on another computer—or, better yet, why not send it to MTV?

—Charles Taft

QUICK CLIPS

Jets!

This CD-ROM aviation encyclopedia will get your engines roaring and your spirits soaring. Action videos, tons of photos, readable text, and engine sounds...multimedia like it ought to be. \$59.95. Medio Multimedia Inc., 800-788-3866.

? MegaDittos

Rush Limbaugh meets Beavis and Butt-Head in a series of Clinton-bashing screensavers as right-wing as the former and as inane as the latter. And I thought political satire was supposed to be funny. \$49.95. Aristo-Soft Inc., 510-426-5355.

? The Greatest Paper Airplanes

Animated tutorials will have you folding and flying like the Wright brothers in no time. But is this really why you spent \$2,000 on a multimedia PC? \$29.95. Kitty Hawk Software Inc., 800-388-9622.

VideoHound Multimedia

The perfect CD-ROM for when you absolutely must know the names of all of Pia Zadora's movies. If it's on video, you'll find it here. Just don't expect to watch a clip of it. \$79.95. Visible Ink Software, 800-735-4686.

SPOTLIGHT ON

ART

Millennium Auction

The idea of bidding in an auction is simple, and in Millennium Auction the implementation is fascinating. The setting is some 20 years in the future, when all cultures have merged under a one-world government. You assume the persona of one of seven internationally renowned art connoisseurs, each of whom has a unique background.

But don't rush to the bidding room just yet. Take time first to browse the dossiers on each of the characters, and to explore the information in the auction catalog. The next stop is the gallery, where you can listen in on the conversations of your fellow bidders. From here, you'll be called to the bidding room, where there

are three bidding sessions per day for the three days of game time, with four art objects sold per session. Your goal is to end up with



the most valuable portfolio. You can hold back purchased items and hope they rise in value, or sell them to third parties whose interests and proposed buying prices are posted on the ArtNet. As in real life, world events can

affect the value of your holdings, so be on the lookout for clues.

There are modern memorabilia and avant-garde schlock—such as President Clinton's saxophone—mixed in with the genuine artworks up for sale. No two games are ever alike, and up to four people can play simultaneously. For a combination of visual style, wit, and addictive fun, nothing approaches this recent release. Going once . . . going twice . . . sold! —without regret, on Millennium Auction.

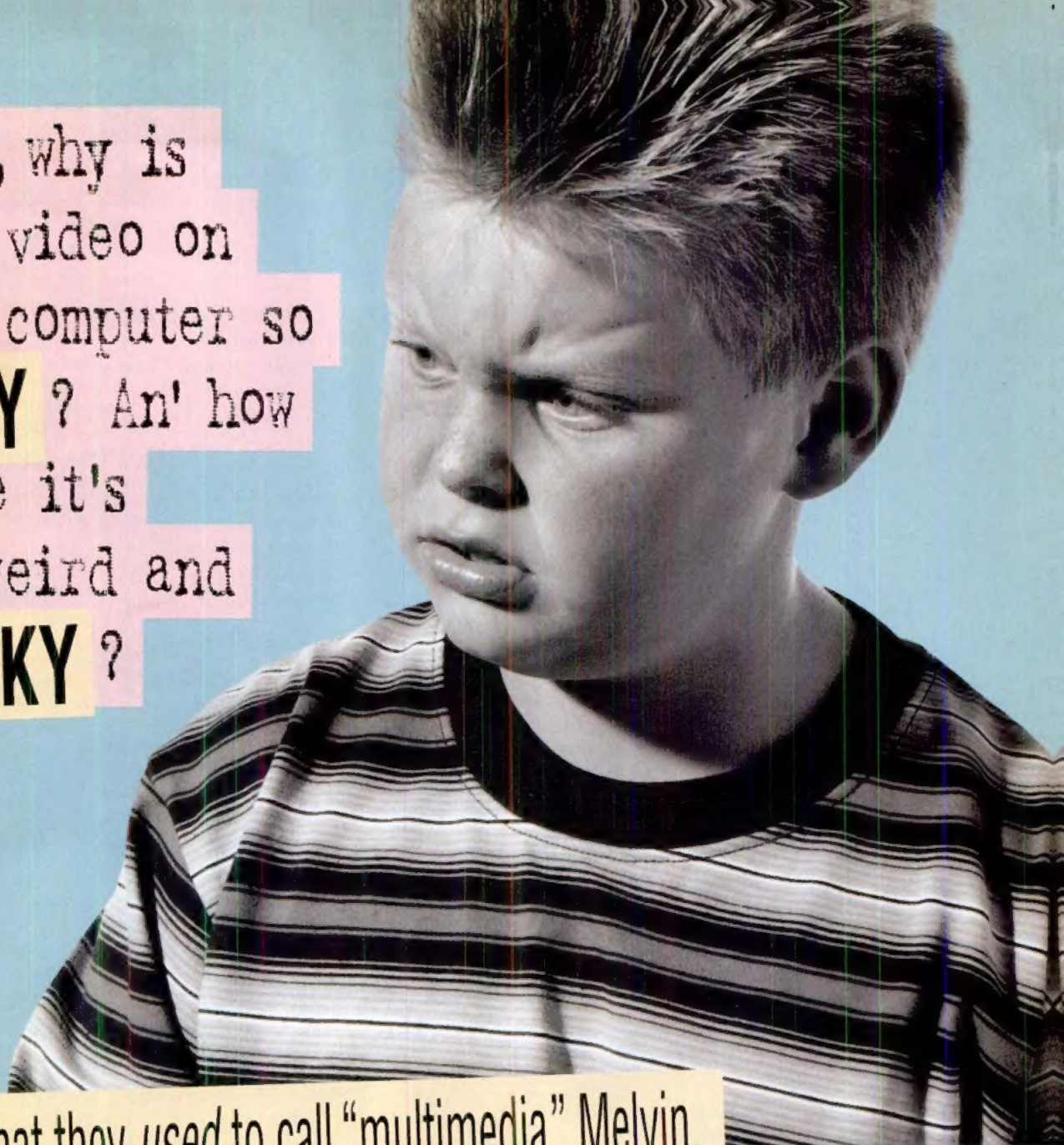
—Barry Brenesal

Eidolon, Inc., 718-884-7095.

Circle 488 on reader service card

★★★★  \$49.95

Mom, why is
the video on
the computer so
TINY? An' how
come it's
so weird and
JERKY?



That's what they *used* to call "multimedia," Melvin.

RealMagic™ is multimedia now! Add the RealMagic card to your system for the incredible realism of smooth screen-filling, full-motion video and 16-bit audio. MPEG is the powerful new digital video and audio standard that puts the "real" in RealMagic.

Enter the exciting new world of interactive MPEG CD-ROMs including

RealMagic is available at:

COMPUSA
THE COMPUTER SUPERSTORE

COMPUTER **City**

OLD MULTIMEDIA



"Old" Video Image

REALMAGIC



Full Motion
Full Screen • Full Sound

For the store near you or more information on RealMagic, call

1-800-845-8086

movies, games, educational titles, music videos and more. RealMagic is available as an MPEG playback card or a complete multimedia upgrade kit. Anything less is history. Get RealMagic and get real multimedia.



REALmagic

As Big As It Gets

© 1994 Sigma Designs, Inc. The Sigma Designs' logo is a registered trademark, and RealMagic and ReelMagic are trademarks of Sigma Designs, Inc. All other brand and product names are property of their respective owners.

SIGMA DESIGNS

CIRCLE 399 ON READER SERVICE CARD

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott



 Sign spotted at St. Paul Technical College's cafeteria. Must be next door to the computer center.

Just as We Suspected

"You can use [Eudora] to tell Hillary just what you think about health care in America. Try president@whitehouse.gov."

—QUALCOMM ADVERTISEMENT

Whaddya Mean, "Geeks"?

The recently revived *Spy* magazine (welcome back, guys) has become our cranky colleague in computer comedy. Regarding the world of on-line services, writer Chip Rowe asks, "How much would you pay to spend your evenings and weekends with a room full of con artists, misogynists, computer geeks, snooty academics, rude teenagers, pushy salesmen, Iowa housewives, bad poets, Nazi sympathizers, certified morons, corporate suits, Elvis fans, recovering alcoholics, aging hippies, pockmarked pornographers, and overzealous FBI agents?"

Is That a Parallel Weegee or A Serial Weegee?

"An unprecocious youth with only slender technical know-how can put a weegee in the back of a bedroom computer, surreptitiously connect it to the cable leading to the living-room TV set, and, sooner than a parent can press the delete button, presto digito! you have multimedia."

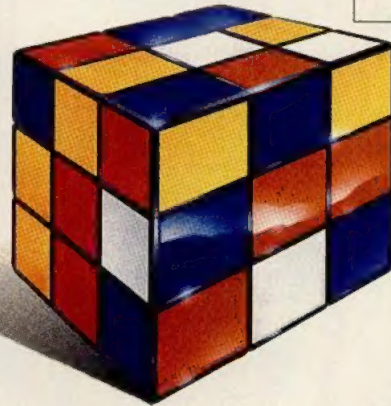
—ARCHITECTURAL DIGEST

Writing great programs is challenging enough.



 Anyone else notice that this Rubik's Cube featured in a Borland ad can't be solved?





The J&J Utilities for OS/2
OS/2 Expletive Utilities Solution

 It's not that bad... (J&J Computer Consulting ad.)

Daffy Documentation

"Like your personal desk, your WP Office mailbox can be divided into two sections: one bin for outgoing items, one for incoming items, and one for personal items."

—WORDPERFECT OFFICE MANUAL

"NOTE: The Recording ON button appears as Recording OFF while recording is in process."

—NORTON PCANYWHERE MANUAL



Richard Ternant

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802. Winners this issue: Sampetch Chowadee, Bill Hinkle, William Homer, Johnathan Lord, Robert McCrae, Steve Weber, and Catherine Young.

WE'VE BROKEN THE \$2000 BARRIER.

**60MHz PENTIUM™
PROCESSOR WITH 15" MONITOR
ONLY \$1999**

MORE DELL LOW PRICES INSIDE.

TO ORDER, CALL NOW.

800-424-1372

In Canada, Call 800-668-3021

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT

Keycode #11BPD

DELL™

Dell Dimension XPS P60

60MHz Pentium™ Processor

\$1999

Business Lease: \$74/MO.

SYSTEM SPECS:

- 8MB RAM
- 340MB Hard Drive (13ms)
- VS15 Monitor (15" CRT, NI)
- PCI Video Card With 1MB Video RAM
- 256KB Writeback Cache
- One Diskette Drive (3.5")
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

Order Code #500023

DELL SPECS:

- 100% money-back guarantee. Return any purchase within 30 days for a full refund.
- Fastest growing FORTUNE 500® company in 1993.
- ISO 9000 certified manufacturing facilities.



Dell's featured computer gets a 100% Satisfaction of San Francisco

AT THIS POWER, IT GOES FAST.

90MHz XPS P90
2X CD-ROM AND PCI LOCAL BUS VIDEO
ONLY \$2599

INSIDE YOU'LL FIND EVEN MORE EVERYDAY LOW PRICES.

**[AT THIS PRICE,
IT GOES FAST.]**

TO ORDER, CALL NOW.

800-388-8239

In Canada, Call 800-668-3021

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT

Keycode #11BPC

DELL™

Dell Dimension™ XPS
P90 mini tower model
90MHz Pentium™ Processor

\$2599

Business Lease⁰: \$96/MO.

SYSTEM SPECS:

- Mini tower model
- 8MB RAM
- 540MB Hard Drive (12ms)
- VS15 Monitor (15" CRT, NI)
- PCI Video Card With 1MB Video RAM
- 2X Multi-session CD-ROM Drive
- 256KB Writeback Cache
- One Diskette Drive (3.5")
- SpaceSaver Keyboard
- MS-DOS® 6.2/Microsoft® Windows™ 3.1/Mouse

Order Code #500024

DELL SPECS:

- 100% money-back guarantee.¹ Return any purchase within 30 days for a full refund.
- Nearly \$3 billion in sales.
- Over 3 million computers sold worldwide in more than 120 countries.

